

[I have identified the single specimen with Sundevall's *Chloropeta icterina*, a species about which very little is known. It differs from *C. natalensis* in its more slender bill and greener plumage, in which the head is like the back. It is much smaller than *C. masaica*, and has not the dusky-brown head of the latter. —R. B. S.]

56. *TERPSIPHONE CRISTATA*.

Terpsiphone cristata (Gm.): Sharpe, Ibis, 1892, p. 304; Shelley, B. Africa, i. p. 99 (1896).

No. 8. ♂ ad. Nairobi, July 12, 1899. Bill and eyelids cobalt-blue; feet leaden blue.

Somewhat common, and found frequenting the forest shambas near Nairobi.

4. A Revision of the Earthworms of the Genus *Amyntas* (*Perichæta*). By FRANK E. BEDDARD, M.A., F.R.S., &c.

[Received May 9, 1900.]

There can be no doubt that this "difficult and extensive genus" urgently requires revision. There has been no comprehensive essay upon the whole series of species comprised in the genus (which I will attempt to define presently) save in my 'Monograph of the Oligochæta.' Since the appearance of that work a very large number of new species have been described, or at least a large number of new names given to members of this genus. In view of recent investigations, the 79 species described in my Monograph should probably be reduced to not more than 56. Some 50 new species may now be added.

I have lately gone through my very large collection of *Perichæta*—or *Amyntas* as it should unfortunately be called¹; and in doing so have noted a number of small facts of systematic, rather than of anatomical, interest which are new. As these concern a considerable number of species and refer to several hundreds of individuals, I was compelled to make for my own use a list of the species of the genus as I defined them. It has appeared to me that the best way of recording these new facts would be in the shape of a revision of the entire genus: this will doubtless be criticised; but I believe that it will at least serve as a means of determining a supposed new form more easily than can be done at present with the scattered literature.

¹ Michaelsen ("Terricolen von verschiedenen Gebieten der Erde," Jahrb. Hamb. wiss. Anst. xvi.) has pointed out that the name *Perichæta*, having been used for a genus of Diptera, must be dropped, and that the name *Amyntas*, formerly dropped on account of its being merely a synonym of *Perichæta*, must be reinstated. Dr. Horst (Zool. Anz. 1900) traverses this conclusion, and would retain *Perichæta* for the worm, since it is not a valid dipteran genus.

It seems to me impossible to avoid the conclusion that a name once used cannot be used again for another genus.

The large number of reputed species of this genus is due to two principal causes. In the first place, it has been tacitly assumed that a *Perichæta* coming from the New World would be certainly different from an Eastern form. We now know that this is not the case, and that in all probability there are no indigenous species outside of the Malayan Archipelago and the adjacent parts of the Asiatic mainland. In the second place, sufficient attention has not been paid in the past to the great variability which is found among the species of this genus. I direct particular attention as regards this matter to the large series of variations seen in such a protean species as *Amyntas hawayanus* or *A. stelleri*. Gradated specimens connect the extreme forms which, when described singly, have been referred to different species, a quite necessary conclusion in view of the facts then known.

I have naturally, therefore, found great difficulty in deciding upon the value of specific characters in the following survey of the species of the genus. There are some characters which seem to be of first class importance and to be not subject to variation. Those characters are:—(1) The setæ on the clitellum, when these are present on every segment and form continuous rows. Otherwise, in those cases, such as *A. hawayanus*, where the setæ are at best but few, they vary in number and in the segments upon which they occur. In such forms as *A. violaceus*, *A. taprobanæ*, there is no variation. (2) The presence or absence of a rounded muscular sac, often containing a protrusible penis, into which the duct of the spermiducal gland opens. This is either present or absent in a given species, definitely present or absent. (3) The cæca again seem to be always either present (in the majority of cases) or absent, with the apparent exception (?) of *A. merabahensis*. (4) The spermathecæ again are, with not many exceptions, constant in number of pairs and position of segments. In one or two instances (*A. dyeri*) their very dorsal position seems to be a valid specific difference. (5) The close approximation of the male pores in a few species (e. g., *A. iris*, *A. halmaheræ*) is a good character. But a slight difference in the remoteness of the two pores must be used with the greatest care, if at all. I have not made use of it here, as I am not convinced that it is possible to eliminate from such slight differences the effects of differing degree of contraction. (6) The position of the last "heart"; this is always in segment xii. (*A. taprobanæ*) or in xiii. (the vast majority of species). The only species which varies at all is *A. stelleri*. (7) The presence or absence of septa in the segments occupied by the gizzard. As a rule those septa (viii./ix., ix./x.) appear to be absent. But in some species, one or both are present and even quite thick. In other cases, there is one very thin septum or not more than traces. The character must therefore be used with great care: its use is marred by the fact that there are not always exact observations upon the point on record. (8) Rarely, e. g. *A. neoguineensis*, the testes, funnels, and sperm-sacs are present to the number of one pair only. This seems to be a non-variable characteristic of those species in which it is met with. (9) The

presence of additional sperm-sacs in segment xiii., and even in x., seems to be distinctive of a few species; but here it is not certain that variations do not occur.

There are next to be considered a number of characters which will probably be of use when they are better known. At present they have to be used with great caution, and cannot be much respected unless they are based upon the examination of a large number of individuals.

(1) The Genital Papillæ.—It does seem that there are species (e. g. *A. padasensis*) in which these structures are entirely absent. But they appear likewise to be occasionally absent from specimens of species which normally possess them. In a few forms they are very constant in number and arrangement. In *A. posthumus*, for example, there are two pairs always (except in obvious asymmetrical monsters) in the same place. But elsewhere they vary enormously. To give one instance: I have examined many specimens of the common *A. heterochætus*, and only once have I found a pair of small papillæ in front of and behind the spermathecal pores, a common enough position for such papillæ in other species.

(2) The relations of the Spermatheca to its Muscular Duct.—Sometimes, as in *A. forbesi* and *A. impudens*, it is easy enough to distinguish the relatively large thick duct from a duct which is practically absent, the pouch being almost sessile. But other cases come so near to each other, and the amount of contraction may be so different, that the character is not always of practical value. The same is the case with the diverticulum. The long spirally-wound accessory pouch of *A. musicus* cannot be confounded with the rudimentary knob of *A. iris*; but the middle examples of the series cannot be so easily defined, and in most cases cannot be distinguished at all. The occasional existence of accessory diverticula upon the main diverticulum does not appear to be constant. Rarely (*A. ijimæ*) there is no diverticulum; but it would be more satisfactory to be assured on the results of section-cutting that the absence is real and not merely apparent.

(3) The length, thickness, and degree of curvature of the muscular duct of the glandular appendage of the sperm-duct is apparently a character of value; but, again, it has to be used with caution, chiefly because the descriptions extant are not always clear upon the point. Also the shape of the gland itself. This, however, does appear to vary considerably in degree of lobation and in size in the same species.

(4) A fourth character which must be used with caution is the extent of the clitellum. Not indeed those cases where it extends beyond the normal segments, but its actual line of commencement and ending upon the xivth and xvth segments. It certainly varies a little in the same species.

(5) It is quite possible, when more is known about the facts, that the point at which the sperm-duct becomes confluent with the duct of its terminal gland will prove to be a character of importance.

(6) An ornamentation of the setæ has been observed in *A. hetero-*

chaetus and in a few other species. Here, again, there are not data to enable the character to be made very wide use of.

In the following pages I have made use of some or all of the characters formulated in the two lists just given. I have also directed attention to size, because it is inconvenient to describe a species without giving some notion of its dimensions. As a matter of fact, size seems to be of practically no importance in the discrimination of species. Neither has colour any *practical* importance. For, in the first place, the colours of earthworms do not as a rule show easily describable variations from species to species; in the second place, there is no doubt that actual variations do occur from individual to individual; and, finally, the bulk of the existing species are known from spirit-preserved specimens, from which in many cases all, and in others some, of the colour-markings have been lost.

Nor does it seem to be very profitable to dwell strongly upon the number of setæ in each segment; at any rate the value of this character has been distinctly exaggerated. The form and extent of the buccal lobe shows only such slight differences from species to species, if any at all, that I have ignored it.

In the following survey of the species I have arranged them in a number of groups for purposes of easier reference. It should be noted that in all the descriptions—unless any remark be made—the following characters are to be added:—Clitellum occupying segments xiv.–xvi. Male pores on xviii. Oviducal pore on xiv. Dorsal pores commencing about xi./xii. Gizzard in viii. Cæca present in xxvi. Last heart in xiii. Testes in x., xi. Ovaries in xiii. Sperm-sacs in xi., xii.

Genus **AMYNTAS**, Kinberg.

Syn. *Rhodope*, *Nitocris*, *Pheretima*, Kinberg. *Perichæta*, Schmarda. *Megascolex*, Baird.

Large (4 feet) to small (1 inch) earthworms. Segments of body comparatively few, often corresponding with length in millimetres. Prostomium never continued by grooves to end of the first segment of the body. Setæ (sometimes ornamented with faint ridges) forming a continuous circle, occasionally interrupted in the ventral and dorsal mid-line, or in either the dorsal or ventral mid-line. Setæ vary in number from about 20 to over 100 on a segment; sometimes stronger on the anterior segments, and at times two or three longer on each side of ventral median line. The setæ are sometimes more crowded ventrally or laterally than dorsally. Clitellum as a rule occupying segments xiv.–xvi., often beginning in the middle of the first and ending at the middle of the last of these segments; rarely extending beyond the xvth. Clitellum developed all round the body, with or without setæ. Only in *A. houletti* are the clitellar setæ different from those on other segments. Dorsal pores as a rule not commencing before segments xi./xii., always present. Male pores on xviii. Oviduca

pore (rarely paired) on xiv. Male pores always separated by some setæ, their degree of approximation varying. Genital papillæ commonly, but not always, present; they are developed in the neighbourhood of the male pores or spermathecal pores, or both. There are apparently two kinds, which may coexist: sucker-like depressions and projecting or flattened areas of modified epidermis. Septa viii./ix. and ix./x. usually, but not always, missing. Gizzard always in segment viii. No calciferous glands. Intestine commences invariably (?) in xv. Intestine nearly always provided with a pair of forwardly-directed cæca of limited (up to five segments) extent. Cæca occasionally divided into not more than 6 cæca. Typhlosole small. The last heart either in xiii., or, much more rarely, in xii. Nephridia "micronephridia" only. Sperm-sacs usually in xi., xii., sometimes extending to x. & xiii. Sperm-reservoirs always present, enveloping sperm-duct funnels in x., xi. Egg-sacs commonly present in xiii. or xiii., xiv. Spermathecae one to six pairs in some, or all, of segments iv.-ix.; occasionally numerous (2-14) in one, or two, segments. Spermathecae always provided with a diverticulum (in which alone the sperm is stored), to which are rarely appended secondary diverticula. Sperm-ducts open in common with a lobate spermiducal gland which varies in size and is rarely absent. The muscular duct of this gland opens directly on to the exterior or through a terminal dilated sac, which may be provided with an exsertile penis. Penial setæ are not present. Glands correspond in many cases to the genital papillæ.

Distribution. Oriental Region, especially Malay Archipelago, but found also (introduced?) in Australia, Africa, America, Europe.

- (1) *Setæ on all segments of clitellum; gizzard-septa absent; spermiducal gland-duct with terminal bulb.*

A. Spermathecae 3 pairs in vii.-ix.

1. *Amyntas houlleti* Perrier.

Perichæta houlleti, Perrier, Nouv. Arch. Mus. viii. p. 99.

P. houlleti, Beddard, Ann. Nat. Hist. (5) xvii. p. 93; id. P. Z. S. 1887, p. 389; id. Zool. Anz. 1888, p. 91; id. P. Z. S. 1890, p. 61; id. Quart. Journ. Micr. Sci. xxx. p. 459.

P. houlleti, Rosa, Ann. R. Accad. Torino, xxix. p. 16; id. Ann. Mus. Civ. Genova, (2) xvi. p. 515.

P. houlleti, Michaelsen, Abh. Senck. nat. Ges. xxi. p. 234; id. Jahrb. Hamb. wiss. Anst. xvi. p. 12 & p. 92; id. Zool. Jahrb., Abth. f. Syst. xii. p. 139.

P. houlleti, Bourne, Journ. Asiat. Soc. Bengal, lviii. p. 110.

P. houlleti, Horst in Weber's Zool. Ergebn. ii. p. 64.

Megascolex houlleti, Vaillant, Annelés, 1889, p. 75.

Perichæta campanulata, Rosa, Ann. Mus. Civ. Genova, (2) x. p. 115.

Perichæta ulekemi, Michaelsen, Arch. f. Naturg. 1892, p. 240.

Perichæta gulielmi, id. Abh. Gebiete Naturw. xiii. No. 2, p. 32.

200 mm. Setæ 52; those of clitellum shorter and bifid at end. Spermathecæ with longish, often zigzag diverticulum: with it open one or more glands.

Hab. Sumatra, and the East generally; Bahamas; Madagascar¹.

The last three synonyms are not absolutely certain. The shape and occurrence of the clitellar setæ is not noted by Michaelsen. At any rate this is the case with his original descriptions. But as he himself includes them as synonyms of *A. houlleti* in a recent paper, it is to be presumed that that point has been verified. The chief distinction between this species and the next is the peculiar form of the clitellar setæ, which were originally figured by myself.

2. *Amyntas travancorensis* Fedarb.

Perichæta travancorensis, Fedarb, Journ. Bombay Nat. Hist. Soc. xi. p. 435.

Perichæta crescentica, id. P. Z. S. 1898, p. 447.

80 mm., 101 segments. Setæ upon clitellum not modified. 10-12 setæ between male pores. Stalked glands associated with spermathecæ, which latter have a zigzag diverticulum. Spermiducal glands much broken up in xvi.-xx.

Hab. Dehra Dun and Travancore, in India; Sumatra(?).

I think that there can be no doubt as to the identity of these two forms, which are among the few species of true *Amyntas* living in the Indian Peninsula. It may be that Horst's "*Perichæta dubia*"² is this species. He describes it as generally like *houlleti*, but without any clitellar setæ. In this case, the name will have to be altered.

(2) *Setæ totally absent from clitellum; gizzard-septa usually absent; terminal bulbus present.*

A. Spermathecæ 5 pairs in v.-ix.

3. *Amyntas pentacystis* Rosa.

Perichæta pentacystis, Rosa, Ann. k.-k. Hofmus. Wien, vi. p. 400.

Amyntas pentacystis, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 95.

135-110 mm., 112-82 segments. Papillæ on segments viii., xvii., xviii. paired. Setæ 100 on viii. Both gizzard-septa present. Cæca absent. Spermiducal glands extend through three segments, with short bent duct. Spermathecæ flattened "tomato-shaped,"

¹ Here as elsewhere I give a list of localities from which the several species have been obtained. I believe, however (with Michaelsen), that the occurrence of the genus outside of the Oriental Region and Japan is accidental and due to man.

² Zool. Ergebn. Max Weber, Bd. xi. p. 69; and Vermes in 'Midden-Sumatra,' p. 7.

with not long diverticulum ; dorsal in position. Sperm-sacs with long dorsal process.¹

Hab. Mahe Island ; Madagascar.

B. Spermatheca 4 pairs in vi.-ix.

4. *Amyntas cingulatus* Vaillant.

Perichæta cingulata, Vaillant, Ann. Sci. Nat. (5) x. p. 228 (in part), and Mém. Soc. Montpellier, vii. p. 146 (in part).

P. darnleiensis, Fletcher, Proc. Linn. Soc. N. S. W. (2) i. p. 966.

P. vaillanti, Beddard, P. Z. S. 1890, p. 66.

P. martensi, Michaelsen, Arch. f. Naturg. 1892, p. 242; id. Abh. Senck. nat. Ges. xxiii. p. 240, and *Oligochæta* in Semon's Forsch. Reise, v. Lief. i. p. 99.

P. indica, Horst, Vermes in 'Midden-Sumatra,' p. 4.

P. eoa, Rosa, Ann. Mus. Civ. Genova, (2) xvi. p. 528 & p. 609.

P. martensi, Horst, Notes Leyd. Mus. xv. p. 324.

P. madelineæ, Benham, Journ. Linn. Soc., Zool. xxvi. p. 219.

Amyntas padasensis, var. *lokonensis*, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 78.

Perichæta belli, Rosa, Ann. Nat. Hist. (7) ii. p. 286.

Megascolex cingulatus, Vaillant, Annelés, 1889, p. 72² (in part).

45-180 mm., 70-125 segments. Setæ up to 66 in a segment, 10-16 between male pores. Sperm-sacs often with dorsal processes. Spermiducal glands xvi.-xviii., with straight or S-shaped duct. Diverticula of spermatheca not long, often with one or more secondary diverticula. Septum viii./ix. occasionally present, but thin.

Hab. Java, Sumatra, Celebes, Mentawai, Philippines, Torres Straits.

It seems to me to be impossible to separate specifically these forms. I point out later that *Perichæta indica* of Horst (as figured in his account of the worms in 'Midden-Sumatra') cannot be *Perichæta indica* of subsequent authors, since it has a large terminal sac to the duct of the spermiducal gland. As far as can be judged, it is, as Horst supposed, the same species as Vaillant's *Perichæta cingulata* figured in his plate. From these I cannot differentiate my *Perichæta vaillanti* in the light of fuller knowledge. The characters of the latter offer no differences from *P. madelineæ*, with which Michaelsen, as I think, rightly unites his "*Amyntas padasensis*, var." As to *martensi* and *eoæ*, they are doubtless identical with each other. The accessory diverticulum reminds us

¹ It is often the case that the dorsal ends of the sperm-sacs have a narrow knob-like projection. It seems to me to be merely a part of the sperm-sac which has not become fully expanded with semen. In the meantime, however, I mention the character where it has been noted.

² *Perichæta cingulata* of Schmarda is of course a *Megascolex*, as now defined.

of that of Fletcher's *P. darnleiensis*. The peculiar investment of nephridial tubules to the spermatheca of *martensi* has not been described in the other forms with which I believe it to be identical: it remains the only difference, and that not perfectly certain. *P. belli* is difficult to separate. The diverticula of the spermathecæ seem to be longer. Only one specimen, however, was examined. Michaelsen has described a var. *javana*.

5. *Amyntas quadripapillatus* Mich.

Amyntas quadripapillatus, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 93.

125 mm., 89 segments. Setæ with slight dorsal gaps, closer ventrally, 40 on v., 52 on xxvi. Large papillæ on xvii., xix. on line with male pores. Spermiducal glands xvii.-xix.; terminal sac small. Diverticulum half the length of spermatheca.

Hab. Sumatra.

The arrangement of the genital papillæ in this species strongly recalls that of *A. posthumus*. There can be no danger of confusing the two species.

C. Spermathecæ 3 pairs in vii.-ix.

6. *Amyntas impudens* Mich.

Amyntas impudens, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 84.

120 mm. (about). Setæ with slight dorsal gaps, closer ventrally; 39 on vi., 58 on xxv.; those on anterior segments enlarged. Paired papillæ on spermathecal segments. Terminal sac of spermiducal gland with extensive penis. Diverticulum of spermatheca longer than sessile pouch, slightly spiral, ending distally after narrow neck in a rounded seminal chamber.

Hab. S.E. Borneo.

Only a single specimen was studied. This appears to differ from the next species chiefly in the spermatheca which are sessile, and in the presence of papillæ.

7. *Amyntas philippinus* Rosa.

Perichæta philippina, Rosa, Ann. k.-k. Hofmus. Wien, vi. p. 397.

Amyntas bindjeyensis, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 94.

240 mm., 125 segments. Setæ 44 on viii., 70 on xii. Sperm-sacs with narrow dorsal prolongations. Spermiducal glands not large, kidney-shaped, with short straight duct.

Hab. Island of Cebu, Sumatra.

I do not see any noteworthy differences in the descriptions of the two forms here united. I follow Rosa's description. Michaelsen figures the spermathecal appendix as coiled and probably longer than pouch.

D. Spermathecæ 2 pairs in vii., viii.

8. *Amyntas ferdinandi* Mich.

Perichæta ferdinandi, Michaelsen, Jahrb. Hamb. wiss. Anst. viii. p. 336.

190 mm., 116 segments. Setæ 55 in middle of body. Male pores somewhat approximated, one-sixth of circumference apart. Spermiducal gland in xvii.-xix., duct bent. Spermathecæ with two shortish diverticula.

Hab. Sangir.

This species seems to differ from its allies by the position of the spermathecæ. The presence of an additional diverticulum suggests a gland such as that of *A. houlleti*. Only two examples were examined.

9. *Amyntas purus* Rosa.

Perichæta pura, Rosa, Ann. Nat. Hist. (7) ii. p. 285.

250 mm., 92 segments. Setæ 54 on v., 96 on xxv., 14 between male pores. Sperm-sacs with dorsal appendages. Spermiducal glands enclosed in xviii., with short duct. Spermathecæ with long diverticulum, the duct of which is thicker at its lower half, as in *A. stelleri*.

Hab. Lombok.

Of this species but one specimen is known.

E. Spermathecæ 3 pairs in vi.-viii.

10. *Amyntas merabahensis* Beddard & Fedarb.

Perichæta merabahensis, Beddard & Fedarb, Ann. Nat. Hist. (6) xvi. p. 72.

200 mm., 146 segments. Male pores rather close. Cæca small. Sperm-sacs x.-xii. Spermathecæ with long diverticulum closely coiled, ending in a globular sac. Spermiducal glands xix.-xxii.

Hab. N. Borneo.

This species has diverticula like those of *A. peguanus*. The duct is much contorted, but cannot be dissected out. It has the appearance of being contained within a sheath. The spermiducal glands are unusual in the fact that they lie entirely behind their duct and of course the terminal bursa. They are much broken up into lobules.

F. Spermathecæ 2 pairs in viii., ix.

11. *Amyntas capensis* Horst.

Megascolex capensis, Horst, Notes Leyd. Mus. v. p. 195.

Perichæta capensis, Horst, in Max Weber's Zool. Ergebn. ii. p. 62; id. Notes Leyd. Mus. xv. p. 322.

Perichæta capensis, Michaelsen, Abh. Senck. nat. Ges. xxiii. p. 229; and *Oligochæta* in Semon's Forsch. Reise, v. Lief. i. p. 99.

Amyntas capensis, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 92.

Perichæta capensis, Ude, Zeitschr. wiss. Zool. lvii. p. 61.

? *P. operculata*, Rosa, Ann. k.-k. Hofmus. Wien, vi. p. 398.

P. tenkatei, Horst, Notes Leyd. Mus. xv. p. 321.

P. tjibodæ, id. ibid. p. 326.

P. inflata, id. ibid. p. 327.

P. falcata, id. ibid. p. 316.

P. variabilis, id. ibid. p. 319.

P. sexta, Benham, Ann. Nat. Hist. (6) xvi. p. 44.

Megascolea sumatranus, Horst, Notes Leyd. Mus. v. p. 189.

Perichæta sumatrana, Horst, Vermes in 'Midden-Sumatra,' p. 5; and Zool. Ergebn. ii. p. 69.

P. sumatrana, Beddard, P. Z. S. 1892, p. 155.

P. capensis, Rosa, Ann. Mus. Civ. Genov. (2) xix. p. 65.

130 mm., 110 segments. Setæ 40 on viii., 60 on xxv.; 12 setæ between male pores. Dorsal pores from vi. Spermiducal glands xv.-xxiv., much broken up. Diverticulum of spermathecæ very long and often coiled like a sheep's horns.

Hab. Java, Engano, Soemba, Sumatra, Timor Cupang, Hong-Kong, Cape of Good Hope, Barbados.

The above list of synonyms is largely in accordance with Dr. Michaelsen's views. I do not, however, follow him in including Benham's *Perichæta willeyi*, since that species has no terminal sac to the duct of the spermiducal gland. I am also of opinion that Rosa's species *P. fasciata* is not rightly included, as the describer says nothing about a sac. In any case, it cannot be doubted that the worms here included in one species are at least exceedingly near to each other in structure. The peculiar ram's-horn appearance of the long diverticulum of the spermathecæ is not apparent in all the individuals, to judge from the published illustrations. But that is very possibly a matter of contraction. It should be observed that it is not clear from Rosa's description that his *operculata* has a terminal muscular sac. Nor does Ude mention this structure in identifying *operculata* with *capensis*. Rosa, indeed, says the duct of the spermiducal gland "führt direct nach aussen." But the sac looks as if it had been extruded in his specimen.

12. *Amyntas caducichætus* Benham.

Perichæta caducichæta, Benham, Ann. Nat. Hist. (6) xvi. p. 47.

133 mm., 105 segments. Setæ 20 on iv., 38 on xxiii., totally absent on x. Spermiducal gland small in xvii.-xix. Diverticulum of spermathecæ long.

Hab. Java.

Were it not for the fact that the setæ are absent in this species from segment x., it would be impossible to avoid placing it with that which has just been described.

13. *Amyntas schmardæ* Horst.

Megascolex schmardæ, Horst, Notes Leyd. Mus. v. p. 194.

Perichæta schmardæ, Michaelsen, Arch. f. Naturg. 1892, p. 235 ;
id. Zool. Jahrb. xii. p. 224.

P. trityphla, Beddard, P. Z. S. 1896, p. 205.

P. vesiculata, Goto & Hatai, Ann. Zool. Jap. iii. p. 21.

80 mm., 93 segments. Anterior setæ slightly larger ; 38 on vi., 49 on xvii. No papillæ. Cæca trifid or even with five divisions. Sperm-sacs with dorsal constricted portion. Spermiducal glands xvii.-xxi., much incised. Diverticulum of spermathecæ long and coiled.

Hab. Japan, Barbados, Honolulu, Oahu, China.

I think that Michaelsen is fully justified in uniting the species referred in the above synonymy ; though it must be remembered that the trifid or multifid cæcum of my *trityphla* was not described by Horst in the type of his *schmardæ*. If it were not for this feature, the species could hardly be separated from *A. capensis*.

P. vesiculata of Goto and Hatai seems to me to be probably this species. The complex cæca agree with this identification, as do other points. The only difference in the descriptions of the two Japanese authors is in the position of the spermathecæ, which are said to be vii., viii. To a Chinese variety with rather fewer setæ per segment, closer packed ventrals, Michaelsen gives the name var. *macrochæta*.

G. Spermathecæ 1 pair in vi.

14. *Amyntas urceolatus* Horst.

Perichæta urceolata, Horst, Notes Leyd. Mus. xv. p. 322 ; Rosa, Ann. Mus. Civ. Genova, (2) xix. p. 65.

110 mm. Setæ 30-40. 12 setæ on v. between male pores. Sperm-sacs with dorsal median process. Spermathecæ (occasionally a second pair in vii. present) with not coiled, not very long, diverticulum.

Hab. Sumatra, Timor Cupang.

H. Spermathecæ 1 pair in viii.

15. *Amyntas montanus* Kinberg.

Pheretima montana, Kinberg, Öfv. K. Svensk. Ak. Förh. 1866, p. 101.

Amyntas montanus, Michaelsen, *ibid.* 1899, p. 437.

Perichæta taitensis, Grube, in Reise der Fregatte Novara, Annel. ii. p. 36 (in part).

Perichæta novaræ, Rosa, Ann. k.-k. Hofmus. Wien, vi. p. 396.

Amyntas novaræ, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 17.

Perichæta pulchra, Michaelsen, Arch. f. Naturg. 1892, p. 233.

- Amyntas pulcher*, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 16.
Perichaeta sangirensis, Michaelsen, Jahrb. Hamb. wiss. Anst. viii. p. 334; id. *ibid.* xvi. p. 76.
P. vitiensis, Beddard, Ann. Nat. Hist. (6) ix. p. 131.
P. crassicystis, Michaelsen, Abh. Senck. nat. Ges. xxiii. p. 204.
P. malamaniensis, Benham, Journ. Linn. Soc., Zool. xxvi. p. 213.
P. arturi, id. *ibid.* p. 205; Beddard, Willey's Zool. Res. p. 184.
P. atheca, Rosa, Ann. Mus. Civ. Genova, (2) xvi. p. 520.
P. zonoporus, Rosa, Ann. Nat. Hist. (7) ii. p. 288.
? *Perichaeta sangirensis*, Horst, Notes Leyd. Mus. xv. p. 317; and Zool. Ergebn. p. 68.

Megascolex montanus, Vaillant, Annelés, 1889, p. 69.

90-150 mm., 110-113 segments. Setæ larger on anterior segments, with slight dorsal gap. 30 on v., 60 on xxvi. Spermisacs often with dorsal process. Septum viii./ix. often present. Spermiducal glands usually divided completely into two halves. Duct much bent, terminal sac with a penis. Spermathecal diverticulum nearly as long as or as long as pouch.

Hab. Celebes, Sumatra, Sangir, Halmahera, Ternate, Malaman, New Britain, Viti, Upolu, Tahiti.

I cannot see how the forms in the above list can be separated. They have, for the most part, a rich violet colour, often showing bandings. As a rule the worms are fairly stout, and the measurements and the number of setæ agree, except in minutia, in the various descriptions. It may be that it will be necessary to distinguish those forms in which the spermiducal gland is not divided into two from the others. It is not clear, for example, whether this is or is not the case with *zonoporus*. The alleged greater complexity of the penial apparatus in some individuals from others seems to me to be not quite certain from the data.

I have been able to dissect (through the kindness of Dr. Michaelsen) two individuals labelled by him *Perichaeta sangirensis*. They differ from such examples of *arturi* (very badly preserved) as I have seen by the fact that the terminal muscular bursa, appended to the spermiducal gland, is relatively small and rounded, and without a projecting penial sac. However, this sac was distinctly less obvious in some specimens. And there is a further reduction of it, as shown by Benham's figure of the corresponding parts of *malamaniensis*. *Perichaeta novaræ* as described by Michaelsen seems to have a larger and rather more complex terminal bursa, like those of *arturi* and *malamaniensis*, and not like the smaller bursa of my *vitiensis*, which is more after the fashion of *sangirensis*.

If a line of division is to be made at all, I should unite *arturi*, *malamaniensis*, and *novaræ*, leaving the others to form a second group.

16. *Amyntas densipapillatus* Mich.

Perichaeta densipapillata, Michaelsen, Abh. Senck. nat. Ges. xxiii. p. 227.

75 mm., 113 segments. Setæ 48 on ix., 57 on xix. Numerous papillæ in neighbourhood of both male pores and spermathecal pores. Sperm-sacs one pair in xi.; testes and funnels also one pair (in x.). Spermiducal glands small, in two segments. Spermathecæ very peculiar, pear-shaped, and of a muscular appearance, with, in that of the left side, a small sac distally.

Hab. Batjan.

This species is one of the few in which the sexual organs are reduced to one pair. The spermathecæ are highly peculiar, and Dr. Michaelsen is inclined to suppose that the main pouch is represented by the small sac, and that the storage of the sperm is undertaken by the muscular duct, the diverticulum being absent. They obviously require further study. Only a single example is known, and therefore it is unnecessary to give an accurate account of those highly variable bodies, the genital papillæ, of which, in the single individual, there were 14 pairs and two unpaired.

I. Spermathecæ 1 pair in ix.

17. *Amyntas racemosus* Rosa.

Perichaeta racemosa, Rosa, Ann. k.-k. Hofm. Wien, vi. p. 399.

110 mm., 100 segments. Setæ closer ventrally, 46 on segment ix. Spermiducal glands small. Spermathecæ with short diverticulum, which is divided distally into three to five chambers.

Hab. Borneo, Java.

I am not quite certain from Rosa's description where to place this species. He observes that the clitellum extends from the seta-rows of segments xiv. to xvi. But whether this means that the setæ are present upon those segments or not, is not quite clear. In any case, it does not seem that this species can be confused with any other.

(3) *Setæ totally absent from clitellum; gizzard-septa usually absent; no bulbous at end of spermiducal gland-duct.*

A. Spermathecæ 6 pairs in iv.-ix.

18. *Amyntas hexatheca* Benham.

Perichaeta hexatheca, Benham, Ann. Nat. Hist. (6) xviii. p. 440.

138 mm., 74 segments, stout in form. Setæ 70 on vi., more than 100 behind clitellum. Papillæ on xvii. (2), xix. (3), xx. (3). Spermiducal gland small, with compact structure. First four spermathecæ very small.

Hab. Celebes.

Only one example of this species has been studied.

B. Spermathecæ 5 pairs in v.-ix.

19. *Amyntas megascolidioides* Goto & Hatai.

Perichæta megascolidioides, Goto & Hatai, Ann. Zool. Japon. iii. p. 21.

240 mm., 118 segments. Setæ 48, 13 between male pores. Male pores on xix. Papillæ paired on xvii., xviii., xx. Spermiducal glands large. Diverticulum of spermathecæ long.

Hab. Japan.

This species is absolutely unique in the genus, by reason of the fact that the male pores open on to the sixth segment. It may be, of course, that in those species, such as *A. hilgendorfi*, in which the position has not been ascertained, owing to the entire absence of a terminal apparatus, it may also open on to that segment.

C. Spermathecæ 4 pairs in vi.-ix.

20. *Amyntas heterochætus* Mich.

Perichæta heterochæta, Michaelsen, Abh. naturwiss. Ver. Hamb. xi. Heft ii. No. 2, p. 6.

Perichæta indica, auctorum¹.

Non *Perichæta indica*, Horst, Vermes in 'Midden-Sumatra,' p. 4.

Perichæta perkinsi, Beddard, P. Z. S. 1896, p. 198.

Perichæta modigliani, Rosa, Ann. Mus. Civ. Genova, (2) vii. p. 134.

Perichæta nipponica, Beddard, Zool. Jahrb. vi. p. 760.

Perichæta mirabilis, Bourne, P. Z. S. 1886, p. 668.

Amyntas heterochæta, Beddard in 'Fauna Hawaiiensis,' 1900, p. 416.

60-190 mm., 110 &c. segments. Anterior setæ larger, 31 on v., 46 on xvi.; they are ornamented. Papillæ paired on vii.-ix., also often two or three quite close to male pore. Spermiducal gland often absent altogether.

Hab. Everywhere, including Europe.

I have already pointed out² that *Perichæta indica* figured by Horst cannot be the same species as that to which the name of *P. indica* has been also given by myself and others, since in the former there is a large end-sac, through which the duct of the spermiducal gland opens on to the exterior; and I agree with Michaelsen in this identification. *P. perkinsi* is at most a variety of the type examples. *Pheretima californica* (see p. 627) of Kinberg is partly identical. *Perichæta modigliani* of Rosa must also be included, since it appears to have the same papillæ near to the male pores. *P. nipponica* has numerous or few secondary diverticula to the spermathecal appendix, apparently resembling *P. darnleiensis* in this. As I only have one specimen of the former, I (in the meantime at least) follow Michaelsen in including it among the synonyms of *A. heterochætus*.

¹ It is not always possible to know what is meant by "*Perichæta indica*."

² Earthworms from Hawaii, in 'Fauna Hawaiiensis,' Cambridge.

21. *Amyntas enganensis* Rosa.

Perichæta enganensis, Rosa, Ann. Mus. Civ. Genova, (2) xii. p. 546.

170 mm., 140 segments. Stoutish worm. Setæ 80 on ix. Spermiducal glands small. Apertures of spermathecæ close together in middle line (2 mm. apart); diverticulum longer than spermathecæ.

Hab. Engano.

Of this form, which is obviously near to *A. heterochætus*, but different by reason of the close approximation of the spermathecal orifices and of the male pores, Dr. Rosa has described a dark-coloured variety, *tetra*.

22. *Amyntas pictus* Mich.

Megascolex pictus, Michaelsen, Arch. f. Naturg. 1892, p. 246.

Amyntas pictus, id. Jahrb. Hamb. wiss. Anst. xvi. p. 83.

240 mm., 137 segments. Setæ slightly larger anteriorly, 66 on v., 79 on xxv. Clitellum xiii.-xviii. Spermiducal glands hardly extend beyond xviii. Diverticula of spermathecæ bifid.

Hab. Borneo.

This species was originally placed in the genus *Megascolex* on account of the slight dorsal gaps in the seta-rows, and, I presume, the form of the spermathecal appendix. The gizzard, however, is like that of *Amyntas* in position. Another very noteworthy feature in the species is the long clitellum. As only one specimen of this worm has been seen, it is unnecessary to comment at length upon its characteristics.

23. *Amyntas dyeri* Beddard.

Perichæta dyeri, Beddard, P. Z. S. 1892, p. 157.

Perichæta sinensis, id. *ibid.* p. 158.

Perichæta monilicystis, Michaelsen, Arch. f. Naturg. 1892, p. 251.

Perichæta dyeri, Michaelsen, Abh. Senck. nat. Ges. xxi. p. 230.

Perichæta shimäensis, Goto & Hatai, Ann. Zool. Jap. iii. p. 15.

126 mm., 104 segments. Setæ larger anteriorly, those setæ being ornamented; 35 on v., 50 on xxi. One or two pairs of large concave genital papillæ behind or also in front of male pores. Spermathecæ opening very dorsally in position. Diverticulum often moniliform.

Hab. Japan, China, West Africa, British Guiana, West Indies, Madagascar, Europe.

There is no manner of doubt as to the inclusion of the three species, *sinensis*, *dyeri*, and *monilicystis*, under one head. It was mainly the colour that led me to differentiate the two which bear my authorization. The moniliform diverticulum is not a specific character, but an occasional condition. The existence of one pair of papillæ is commoner than two pairs. I found individuals with only one pair, with two pairs, and some in which there was an asymmetry, only one of the anterior pair being present. The

position of the spermathecal orifices is unusual, but is paralleled in *A. trinitatis*.

24. *Amyntas vordermanni* Horst.

Perichæta vordermanni, Horst, Notes Leyd. Mus. xii. p. 231.

315 mm., 175 segments. Setæ 80-90 behind clitellum. Sucker-like papillæ paired on xvii., xviii.; besides these, prominent papillæ on same segments in line of setæ, in front of that of xvii. and behind that of xviii. on each side. Also papillæ on vii., viii. Spermiducal glands xvii.-xxii. Large gland corresponding to papillæ in this region of body. Spermathecæ with diverticulum half their length.

Hab. Billiton.

25. *Amyntas padasensis* Beddard & Fedarb.

Perichæta padasensis, Beddard & Fedarb, Ann. Nat. Hist. (6) xvi. p. 73.

- Non *Amyntas padasensis*, Michaelsen, Jahrb. Hamb. wiss. Aust. xvi. p. 74.

280 mm., 96 segments. Setæ slightly larger anteriorly; occasionally more closely crowded ventrally, especially on xvii., xviii. Male pores divided by 10 setæ. Spermiducal glands with thick straight duct. Diverticula of spermathecæ with accessory sperm-chambers. Sperm-sacs in x.-xiii., those of xi., xii. with a small apical lobe, as in many other species.

Hab. Borneo.

In this species the difference in size between individuals is great. Two examples from Padas Valley were respectively 280 and 187 mm. Those from Merabah about 120 mm. or so. The spermathecæ have a remarkably strong duct, nearly as wide, and quite as long, as the pouch. The diverticula are not always provided with additional swellings; but they are often so. The arrangement is like that of the Japanese worm I called *Perichæta nipponica*, *Amyntas daruleiensis*, and also *A. martensi*, where the same occurrence and non-occurrence of the supplementary diverticula is met with. I have seen five specimens of this species, the two large ones from Padas and the smaller ones from Merabah.

26. *Amyntas trinitatis* Beddard.

Perichæta trinitatis, Beddard, P. Z. S. 1896, p. 206.

150 mm., 100 segments. Setæ on vi.-ix. larger, 45 on xvii.; 19 setæ between male pores. Spermiducal glands in xvii.-xxi., with horseshoe-shaped duct. Spermathecæ open near to dorsal middle line, with diverticulum longer than pouch.

Hab. Trinidad.

This species appears to be distinct. It differs from *A. heterochætus* mainly in dorsal position of spermathecal pores, in larger number of setæ between male pores, and in larger diverticulum of spermathecæ. It has egg-sacs in xiii., xiv.

27. *Amyntas divergens* Mich.

Perichæta divergens, Michaelsen, Arch. f. Naturg. 1892, p. 243.

Amyntus divergens, id. Jahrb. Hamb. wiss. Anst. xvi. p. 8.

P. fuscata, *P. heteropoda*, *P. obscura*, *P. scholastica*, *P. micronaria*, *P. grossa*, Goto & Hatai, Ann. Zool. Jap. ii. p. 66, &c.

120 mm., 120 segments. Setæ of anterior segments stronger, 33 on v., 48 on xxv. Paired papillæ on vii.-ix. near spermathecal pores, to which correspond internally stalked glands; also on xvii.-xx. Sperm-sacs with dorsal process. Spermiducal gland totally absent.

Hab. Japan.

I take the above description entirely from Michaelsen. He is of opinion that the species described by Messrs. Goto and Hatai enumerated above are to be looked upon as mere variations. To these, indeed, he adds some few others which I partly identify with other known forms of Japanese *Amyntas*. This arrangement, however, cannot but be regarded as quite preliminary. A renewed investigation of the Japanese species is to be desired.

In the meantime it may be mentioned that in *P. fuscata*, *P. scholastica*, *P. grossa*, and *P. micronaria* there is a spermiducal gland. But this of course is no reason against the identification of the various forms here grouped together as one species.

28. *Amyntas izukai* Goto & Hatai.

Perichæta izukai, Goto & Hatai, Ann. Zool. Jap. iii. p. 14.

235 mm., 137 segments. Setæ 40 on v., 60 posteriorly, longer on anterior segments. Paired papillæ on xix.-xxiii. in line with male pores. Cæca absent. Spermiducal glands confined to xviii. Spermathecæ with long duct and equally long appendix.

Hab. Japan.

The disposition of the genital papillæ in this species is like that of *A. forbesi* and *A. biserialis*. But the four pairs of spermathecæ distinguish the present species from either of those.

29. *Amyntas bosschæ* Horst.

Perichæta bosschæ, Horst, Notes Leyd. Mus. xv. p. 324.

Perichæta bosschæ, Michaelsen, Abh. Senck. nat. Ges. xxiii. p. 238.

170 mm., 125 segments. Setæ ornamented; 37 on v., 40 on xxiv.; 8 setæ between male pores. Sperm-sacs in x.-xii. Spermiducal glands not large. Spermathecæ with short diverticulum.

Hab. Borneo.

D. Spermathecæ 3 pairs in vii.-ix.

30. *Amyntas carinensis* Rosa.

Perichæta carinensis, Rosa, Ann. Mus. Civ. Genova, (2) x. p. 107.

200 mm., 150 segments. Setæ closer ventrally, 60 on viii. Papillæ one pair on xviii. between male pores. Sperm-sacs very

large, extending backwards to spermiducal gland. Spermiducal glands in three segments. Spermathecae very large, posterior pair reaching the anterior sperm-sac, with slender diverticulum nearly as long.

Hab. Mt. Carin (Buruna).

31. *Amyntas ælianus* Rosa.

Perichæta æliana, Rosa, Ann. Mus. Civ. Genova, (2) xii. p. 545.

100 mm., 120 segments. Setæ 74 on xiii. Male pores closely approximated, only 2 mm. apart. Spermiducal glands with short straight duct. Spermathecae opening as close together as male pores, with very long diverticulum wound into a mass larger than pouch.

Hab. Engano.

32. *Amyntas minahassæ* Mich.

Perichæta minahassæ, Michaelsen, Abh. Senck. nat. Ges. xxiii. p. 235.

Amyntas minahassæ, id. Jahrb. Hamb. wiss. Anst. xvi. p. 51.

48-105 mm., 92-113 segments; stoutly built worm. Setæ with dorsal gaps closer ventrally, 60 on x., 74 on xxvi. Deep suckers in front and behind each male pore on xvii./xviii., xviii./xix.; also small papillæ on xviii. and xix., and less constantly on xvii. Sperm-sacs in x.-xii. Duct of spermiducal gland short and straight. Diverticulum of spermathecae longer than, or as long as, pouch.

Hab. Celebes.

The fact that ripe individuals of this species sometimes only reach a length of 48 mm. shows how careful it is necessary to be in founding specific differences upon size.

33. *Amyntas castaneus* Mich.

Amyntas castaneus, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 56.

50 mm., 95 segments. Setæ with slight dorsal gaps, a little closer ventrally, 40 on vi. and xxvi. In front of and behind male pores a furrow. Papillæ paired on xvii.-xx. near middle line, and a fifth pair on xvii. still more ventral. Spermiducal gland in four segments, with thick straight duct. Diverticulum of spermatheca a little shorter than pouch.

Hab. Celebes.

34. *Amyntas kalaenensis* Mich.

Amyntas kalaenensis, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 68.

50 mm., 93 segments. Setæ with slight dorsal gaps, 44 on xii., 49 on xxvi. A slit-like depression in front of and behind each male pore. Spermiducal gland small, with short straight duct. Diverticulum longer than spermatheca.

Hab. Celebes.

As this species is distinguished from the last by Michaelsen, who

has described both, I separate them here. But the present form is known only from one specimen, and may prove to be not different from *A. castaneus*. It has, it will be observed, the slit-like suckers by the male pores, found, however, in other forms, such as *A. novæ-britanniæ*.

35. *Amyntas burchardi* Mich.

Amyntas burchardi, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 88.

270 mm., 126 segments. Setæ ornamented, larger anteriorly and also dorsally on all segments, with slight dorsal gaps; 34 on v., 62 on xxvi. 40 small papillæ between male pores. The sperm-sacs have a dorsal appendix. Spermiducal glands from xvii.–xxi., broken up into minute lobules, almost granular. Diverticulum slightly longer than spermatheca.

Hab. Sumatra.

The papillæ suggest those of *A. papulosus*, with which, however, the present species (known by a single example only) is not to be confounded.

36. *Amyntas ocellatus* Mich.

Amyntas ocellatus, Michaelsen, loc. cit. p. 89.

175 mm., 150 segments. Setæ ornamented, larger on anterior segments; 28 on vi., 49 on xxvi. Papillæ in two rows of 3–6 behind and before seta-line of xviii.; two in front of each spermathecal pore; there are others varying in the same segments. Sperm-sacs with appendices. Spermiducal gland in four segments. Diverticulum hardly so long as spermatheca.

Hab. Sumatra.

37. *Amyntas tobaensis* Mich.

Amyntas tobaensis, Michaelsen, loc. cit. p. 91.

105 mm., 112 segments. Setæ with slight dorsal gaps, closer ventrally; 54 on v., 47 on xxvi. Three small papillæ by each male pore, and two or three pairs close to orifices of spermathecæ. Sperm-sacs with an appendix. Spermiducal glands in xvii.–xx. Diverticulum coiled, half as long as spermatheca.

Hab. Sumatra.

38. *Amyntas californicus* Kinberg.

Pheretima californica, Kinberg, Öfv. K. Svensk. Ak. Förh. 1866, p. 102 (in part.).

Amyntas californicus, Michaelsen, ibid. 1899, p. 438.

Megascolex californicus, Vaillant, Annelés, 1889, p. 70.

Perichæta ringeana, Michaelsen, Jahrb. Hamb. wiss. Anst. vii. p. 60.

Perichæta guarini, Rosa, Atti R. Accad. Torino, xxix. p. 13.

Amyntas ringeanus, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 116 & p. 120.

50–125 mm., 55–110 segments. Setæ larger ventrally and on

the anterior segments; those of segment x. very small; 34 on v., 60 on xxv. Setæ ornamented. Spermathecæ with long duct.

Hab. Mexico, Madeira, Egypt, California.

This species is placed among those with three pairs of spermathecæ on account of the fact that one specimen had three pairs of these organs. But two pairs in viii. and ix. seems to be the more usual condition. It is not an easily definable species and may not be distinct. Its chief character (but this has not been looked for in many other species) is a series of vesicular bodies attached to the nephridia after segment xxx.

39. *Amyntas udei* Rosa.

Perichæta udei, Rosa, Ann. Mus. Civ. Genova, (2) xvi. p. 521.

Amyntas udei, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 87.

66 mm., 90 segments. Setæ closer ventrally; 40 on vii., 39 on xxvi. 8 setæ between male pores. Septum vii./ix. rudimentary. Spermiducal glands limited to xviii., with short slightly curved (S-shaped) duct. Diverticulum of spermatheca half the length of pouch.

Hab. Sumatra.

40. *Amyntas juloides* Mich.

Amyntas juloides, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 53.

145 mm., 119 segments. Setæ with slight dorsal gaps, closer ventrally; 60 on vi., 86 on xxv. Papillæ one in front of and one behind each male pore; five median on xviii.; one on xvii., xix. Septum viii./ix. thin. Sperm-sacs with a median process. Spermiducal glands with slightly bent duct. Diverticulum of spermathecæ less than pouch.

Hab. Celebes.

41. *Amyntas peguanus* Rosa.

Perichæta peguana, Rosa, Ann. Mus. Civ. Genova, (2) x. p. 113.

Perichæta peguana, id. Ann. Nat. Hist. (7) ii. p. 289.

170 mm., 120 segments. Setæ 56 on viii. Papillæ on xvii./xviii., xviii./xix., paired in front of and behind male pores. Septum viii./ix. present. Spermiducal glands in three segments, with curved duct. Diverticula of spermathecæ long but coiled into a tight coil, which cannot be separated. Round sacs of muscular appearance corresponding internally to papillæ.

Hab. Burma, Penang, Siam.

I do not agree with Rosa as to the absence of the septum viii./ix. I found it to be distinctly present in individuals examined by myself.

42. *Amyntas flavescens* Goto & Hatai.

Perichæta flavescens, Goto & Hatai, Ann. Zool. Japon. ii. p. 72.

Perichæta producta, iid. ibid. p. 73.

140 mm., 120 segments. Setæ 30-50; 8 between male pores.

Papillæ paired on vii.-ix., and three or four surrounding male pore. Spermiducal gland sometimes wanting. Spermathecæ either without or with but minute diverticulum.

Hab. Japan.

This species, which Michaelsen merges with his *A. divergens*, has, I think, claim to distinction on account of the three pairs of spermathecæ in segments vii.-ix., with absent diverticula or with (in the case of the variety *flavescens*) only minute diverticula to the pair of spermathecæ in segment viii.

E. Spermathecæ 2 pairs in viii., ix.

43. *Amyntas semifasciatus* Mich.

Amyntas semifasciatus, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 49.

110 mm., 88 segments. Setæ 45 on v., 62 on xxiv. Small papillæ, one or two pairs on xvii., xix. Both gizzard-septa present but thin. Spermiducal glands in xvii., xviii., with bent duct. Diverticulum of spermatheca very short.

Hab. Celebes.

Only a single specimen has been described.

44. *Amyntas æruginosus* Kinberg.

Amyntas æruginosus, Kinberg, Öfv. K. Svensk. Ak. Förh. 1886, p. 101.

Amyntas æruginosus, Michaelsen, Öfv. K. Svensk. Ak. Förh. 1899, p. 434; id. Jahrb. Hamb. wiss. Anst. xvi. p. 4.

Megascolex æruginosus, Vaillant, Annelés, 1889, p. 82.

Perichæta musica, Michaelsen, Oligochæta in Semon's Forsch. Reise, v. Lief. i. p. 99.

Megascolex musicus, Horst, Notes Leyd. Mus. v. p. 193.

Perichæta musica, Horst, Notes Leyd. Mus. xii. p. 236; id. ibid. xv. p. 338; id. Zool. Ergebn. Max Weber, Bd. ii. p. 59.

Perichæta musica, Vordermann, Natuurk. Tijdschr. Ned. Indië, xli. p. 1, & xliv. p. 1.

Perichæta fasciata, Rosa, Ann. Mus. Civ. Genova, (2) xii. p. 543, & xvi. p. 609.

Perichæta longa, Horst, Notes Leyd. Mus. xv. p. 325.

Perichæta musica, Ude, Zeitschr. wiss. Zool. lxvii. p. 63.

Perichæta musica, Michaelsen, Arch. f. Naturg. 1892, p. 238.

Perichæta musica, Rosa, Atti R. Accad. Torino, xxix. p. 8.

Perichæta longa, Michaelsen, Arch. f. Naturg. 1892, p. 239.

Perichæta willeyi, Benham, Ann. Nat. Hist. (6) xvi. p. 41.

180-570 mm., 100-166 segments. Setæ from 50-100. 17 setæ between male pores. Spermiducal glands in xviii. only; duct short and straight. Diverticulum of spermatheca very long and much coiled.

Hab. Java, Sunatra, Guam.

This, the largest of all species of *Amyntas*, and one of the largest

of earthworms, should obviously include the specific names given above, which really only differ in size. Its characters, save those of size, are by no means salient, and with difficulty can it be separated from the next species. I also place here *A. willeyi*, which cannot be, as is suggested by Michaelsen, a synonym of *capensis* since the latter has a terminal bursa. I am rather inclined to think that *operculata* (see p. 618) should come here.

45. *Amyntas upoluensis* Beddard.

Perichæta upoluensis, Beddard, Proc. Roy. Soc. Edinb. xiv. p. 174, and Willey's Zoological Results, part ii. p. 185.

Perichæta recta, Rosa, Ann. Nat. Hist. (7) xi. p. 284.

166 mm., 110 segments. Setæ 46 on x., 54 on xxv. 7 setæ between male pores. Papillæ one median on x., and a variable number of also unpaired papillæ on xvii.–xxi. (xxii). Two or three minute papillæ close to each male pore. Spermiducal gland in xvi.–xviii.; duct short and straight. Diverticulum of spermathecæ very long.

Hab. Upolu, Esafate.

46. *Amyntas sluiteri* Horst.

Perichæta sluiteri, Horst, Notes Leyd. Mus. xii. p. 234.

190 mm., 135 segments. Setæ 60–75, more closely packed ventrally. Sperm-sacs x.–xii. Spermiducal gland nearly divided into two, of loose structure, its duct sinuous. Spermathecæ with zigzag diverticulum as long as pouch.

Hab. Billiton.

47. *Amyntas halmaheræ* Mich.

Perichæta halmaheræ, Michaelsen, Abh. Senck. nat. Ges. xxiii. p. 208.

Perichæta jampeana, Benham, Ann. Nat. Hist. (6) xviii. p. 430.

Amyntas jampeanus, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 61.

Perichæta bonthainensis, Benham, loc. cit. p. 437.

Perichæta digitata, Benham, loc. cit. p. 432.

Perichæta purpurea, Benham, loc. cit. p. 445.

? *Amyntas fissiger*, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 67.

95–420 mm., 116–148 segments. Setæ 70–130 on xxvi.; they are ornamented. Male pores rather close together. Papillæ very variable in neighbourhood of male pores and spermathecal pores. Spermiducal gland not very large. Diverticulum longer than pouch.

Hab. Celebes, Halmahera, Batjan.

Dr. Michaelsen has indicated the close likeness which all the forms here brought together exhibit. He, however, would allow three species, viz., *A. halmaheræ*, *A. jampeanus*, *A. purpureus*. The reasons for uniting all must now be dealt with. *A. halmaheræ* (with varieties *gamsungi*, *batjanensis*, *cæcilia*, *kauensis*, *galelensis*,

imparicystis) agrees with *A. jampeanus*, as described by Benham, in size: the extremes are different, viz. 130 & 420 mm.; but the following measurements unite these extremes to some extent:—170, 220 of *halmaheræ*, and 370, 280, 240, & 225 of *jampeanus*. The genital papillæ differ enormously in the varieties of *halmaheræ*: in one there are but a single pair on xvii., at the other extreme we have something like twelve pairs in the neighbourhood of the spermathecal orifices and eleven pairs posteriorly.

From this to *A. jampeanus* with no papillæ is not a wide jump; and it must be remembered that Benham described only three examples of the species. In any case *P. bonthainensis* has rows of three such papillæ on xvii., xix., xx. The number of setæ is certainly smaller in the typical *halmaheræ* from what is found in the typical *jampeanus*, i. e. 80 on xxv. to 130 on the same segment. But this discrepancy is reduced in significance by Dr. Michaelsen's description of a variety of *jampeanus* in which that segment had but 86. To this and to another variety the names of *tigrina* and *fumigata* were given by Michaelsen. In all of these forms the male pores are more closely approximated than is the rule in *Amyntas*. A difference shown by *digitata* is the "digitate" condition of the cæca. But this is shown to nearly the same extent in *halmaheræ*. In the former, again, the spermiducal glands are small, and actually confined to the xviiiith segment. We find, however, here again a series of stages: in specimens of *bonthainensis* examined by Michaelsen those glands only occupied two segments; the rule for the species, as it appears, is for them to fill three segments. It would seem at first sight more unreasonable to include the small species *A. purpureus*. The species is as small as 72 mm. in length, which contrasts with the 420 mm. of *A. jampeanus*. But the largest individual of *purpurea* described by Dr. Benham measures 95 mm., which is after all not so great a difference from the smallest of *halmaheræ*. I include it in the present form in agreement with Dr. Michaelsen, who however did not actually place the name as a synonym of the rest. The male pores are close together as in the other varieties. The setæ are however fewer, not more than 70 upon the xxvth segment. That the diverticulum of the spermatheca is straight and not coiled does not appear to me to be at all a valid distinction.

48. *Amyntas aspergillum* Perrier.

Perichaeta aspergillum, Perrier, Nouv. Arch. Mus. Paris, viii. p. 118.

Perichaeta aspergillum, Rosa, Ann. k.-k. Hofm. Wien, vi. p. 403.

Amyntas aspergillum, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 10.

Perichaeta takatorii, Goto & Hatai, Ann. Zool. Japon. ii. p. 76.

Megascolex aspergillum, Vaillant, Annelés, 1889, p. 76.

180–375 mm., 150 segments. Setæ 48 on v., 97 on xxvi. Setæ ornamented, ventral larger than dorsal on many segments. Male pores surrounded by ten papillary pores; spermathecal apertures

by rather fewer. Duct of spermiducal gland bent. Diverticulum of spermathecæ the length of pouch.

Hab. South China, Japan.

49. *Amyntas sarasinorum* Mich.

Amyntas sarasinorum, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 71.

165 mm., 95 segments. Setæ 45 on v., 56 on xxvi. Male pores rather close. Spermiducal gland limited to xviii. Diverticulum of spermathecæ not long, with an accessory diverticulum.

Hab. Celebes.

This species clearly approaches *Amyntas halmaheræ*. The male pores, rather close, are not quite so nearly approximated as in that species; the cæca show the commencement of the digitation so pronounced in "*digitata*." This latter form moreover has the spermiducal gland confined to segment xviii., as is the case with *A. sarasinorum*.

50. *Amyntas esafatæ* Beddard.

Perichæta esafatæ, Beddard, Willey's Zool. Results, part ii. p. 187.

115 mm., 105 segments. About 8 pairs of papillæ on segments xvii.-xix. Four setæ between male pores, but orifices not closely approximated. Diverticulum of spermatheca longer than pouch.

Hab. Esafate, New Hebrides.

51. *Amyntas masatakæ* Beddard.

Perichæta masatakæ, Beddard, Zool. Jahrb., Syst. Abth. vi. p. 761.

Perichæta campestris, Goto & Hatai, Ann. Zool. Japon. ii. p. 67.

125 mm., 90 segments, of stout build. 11-15 setæ between male pores. Anterior setæ larger. Three small papillæ surrounding male pore; anteriorly a pair lying to inside of, and before, and in front of each spermathecal aperture. To all these correspond stalked glands. Spermiducal glands absent, only duct represented, which is curved. Diverticulum of spermatheca long and straight, longer than pouch.

Hab. Japan.

I regard *Perichæta campestris* as synonymous with my species. It has two pairs of spermathecæ in the same segments, which appear however to have shorter diverticula. The presence of a spermiducal gland in *campestris* does not invalidate the comparison, since we have cases like *A. heterochætus*, where this gland may be absent or present. The papillæ too are slightly different in the two forms. Still *campestris* appears to be more like *masatakæ* than *divergens*, where it was placed by Michaelsen.

52. *Amyntas novæ britannicæ* Benham.

Perichæta novæ britannicæ, Benham, Journ. Linn. Soc., Zool. xxvi. p. 199.

Perichæta novæ britannicæ, Beddard, Willey's Zool. Results, pt. ii. p. 183.

130 mm., 120 segments. Setæ 56 on vi., 74 on xxvi. Papillæ, two deep pits on xvii., xviii. Spermiducal gland in xvi.-xviii., with straight duct; orifices, as of the spermathecæ, close. Diverticulum as long as pouch.

Hab. New Britain.

f. *Spermathecæ* 2 pairs in vii., viii.

53. *Amyntas tokioensis* Beddard.

Perichæta tokioensis, Beddard, Zool. Jahrb., Syst. Abth. vi. p. 762.

Perichæta candida, Goto & Hatai, Ann. Zool. Japon. ii. p. 77.

Perichæta parvicystis, Goto & Hatai, *ibid.* iii. p. 18.

70-150 mm., 67-95 segments. Setæ 40. Papillæ two to three near male pores and paired on vi.-viii., with stalked glands. Spermiducal glands (sometimes absent) xvii.-xx., with curved duct. Spermathecal diverticulum long and straight.

Hab. Japan.

I think that there can be hardly a question as to the justice of uniting the forms which have received the three names quoted above. The fact that the spermiducal gland is absent in the form termed by Goto and Hatai "*candida*" is not necessarily an objection to this proceeding.

54. *Amyntas hesperidum* Beddard.

Perichæta hesperidum, Beddard, P. Z. S. 1892, p. 169, and *Fauua Hawaiiensis*, 1900.

Perichæta sandvicensis, Beddard, P. Z. S. 1896, p. 203.

Amyntas löhri, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 12.

100 mm., 105 segments. Setæ stronger on anterior segments; 33 on v., 53 on xvi. 18 setæ between male pores. Septum viii./ix. occasionally present, but thin. Spermiducal glands in three segments. Diverticulum of spermatheca coiled, not long. Sperm-sacs with dorsal diverticula.

Hab. Hong Kong; Hawaii; Barbados.

It is only the comparative shortness of the spermathecal appendix that differentiates this species from *æruginosus*; the two are close.

55. *Amyntas hilgendorfi* Mich.

Perichæta hilgendorfi, Michaelsen, Arch. f. Naturg. 1892, p. 235, and Jahrb. Hamb. wiss. Anst. xvi. p. 9.

Perichæta rokugo, Beddard, Zool. Jahrb., Syst. Abth. vi. p. 76.

Perichæta irregularis, Goto & Hatai, Ann. Zool. Japon. iii. p. 13.

Perichæta schizopora, Goto & Hatai, *ibid.* ii. p. 76.

150 mm., 120 segments. Setæ 40-60. Group of pores on viii. in front of ring of setæ on to which open a number of stalked

glands. Cæca 6-8. Spermiducal gland and duct entirely absent. Spermathecæ with long straight diverticulum.

Hab. Japan.

The above synonymy is partly due to the fact that my description and that of Michaelsen were published at about the same time. I follow Michaelsen in regarding *P. schizopora* of Goto & Hatai as a synonym. It has moreover but one pair of spermathecæ in viii. It is possible that the present species is the same as *P. glandularis* of the two authors referred to. But in the meantime I keep that species separate. *P. irregularis* of the same authors has no spermathecæ and no gland-patches, but perhaps is the same.

56. *Amyntas annulatus* Horst.

Megascolex annulatus, Horst, Notes Leyd. Mus. v. p. 186.

Perichæta annulata, id. ibid. xii. p. 236.

195 mm., 130 segments. Setæ 60 on viii. Male pores separated by 30 setæ, thus, as are the spermathecal pores, dorsal in position. Papillæ seven pairs on xvii.-xix. Spermiducal gland in xvii.-xix. Spermatheca with diverticulum about half its length.

Hab. Malay Archipelago.

I am indebted to Dr. Horst for some further details concerning this species, which are embodied in the above description.

57. *Amyntas japonicus* Horst.

Megascolex japonicus, Horst, Notes Leyd. Mus. v. p. 192.

220 mm. Male pores on a long J-shaped groove, extending over xviii. and part of xvii. Setæ 66. Spermiducal glands in xvii.-xix., much lobate, with horseshoe-shaped duct. Diverticulum of spermatheca straight and slender, not so long as pouch.

Hab. Japan.

58. *Amyntas glandularis* Goto & Hatai.

Perichæta glandularis, Goto & Hatai, Ann. Zool. Japon. iii. p. 18.

150 mm., 104 segments. Setæ 60 in vii. 19 setæ between male pores. Cæca six pairs. Median glandular area on vii. and xviii., through which open masses of stalked glands; also three or four isolated stalked glands in neighbourhood of spermathecal and of male pores. Only duct of spermiducal gland present. Spermathecæ with long diverticulum.

Hab. Japan.

This species comes near to *A. hilgendorfi* in the masses of white glands opening on to the exterior by a median perforated area. But it seems to be a different species.

59. *Amyntas levis* Goto & Hatai.

Perichæta levis, Goto & Hatai, Ann. Zool. Japon. iii. p. 20.

85 mm., 88 segments. Setæ 45-48. Papillæ near to spermathecal pores, on to which open stalked glands. Cæca five pairs.

Spermiducal gland entirely absent. Diverticulum of spermatheca long.

Hab. Japan.

60. *Amyntas vittatus* Goto & Hatai.

Perichæta vittata, Goto & Hatai, Ann. Zool. Japon. ii. p. 74.

100 mm., 68 segments. Setæ 57 on vii., 60 on xviii. Cæca six pairs. Spermiducal glands entirely absent. Spermathecae three pairs in each of their two segments.

Hab. Japan.

G. Spermathecae 3 pairs in vi.-viii.

61. *Amyntas bournei* Rosa.

Perichæta bournei, Rosa, Ann. Mus. Civ. Genova, (2) x. p. 110.

150 mm., 130 segments. Setæ 60. Papillæ, two by each male pore and one close to each spermathecal orifice, provided with glands. Spermiducal gland not very large, its duct curved. Diverticulum of spermatheca as long as pouch.

Hab. Burma.

I am much disposed to think that this species is really *hawayanus*.

62. *Amyntas proporus* Rosa.

Perichæta propora, Rosa, Ann. Mus. Civ. Genova, (2) xvi. p. 522.

60 mm., 62 segments. Setæ more crowded below, 44 on vii., 40 on xvii. Two or three minute papillæ behind each spermathecal pore. Spermiducal gland in xvi.-xxi., with curved duct. Diverticulum of spermathecae longer than pouch and zigzag above.

Hab. Sumatra.

Perhaps the same remark may be made about this species as about the last.

63. *Amyntas sieboldi* Horst.

Megascolex sieboldi, Horst, Notes Leyd. Mus. v. p. 191.

Perichæta sieboldi, Michaelsen, Arch. f. Naturg. 1892, p. 235.

Perichæta sieboldi, Beddard, Zool. Jahrb., Syst. Abth. vi. p. 759; Horst, Notes Leyd. Mus. xx. p. 240; Goto & Hatai, Ann. Zool. Jap. ii. p. 65.

Perichæta sieboldi, Rosa, Ann. k.-k. Hofm. Wien, vi. p. 401.

Perichæta communissima, Goto & Hatai, Ann. Zool. Jap. iii. p. 23.

Amyntas sieboldi, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 9.

145-270 mm., 91-145 segments. Setæ 80 on viii. No papillæ. Septum ix./x. present. Cæca 6-7 arising in same segment one above the other. Spermiducal gland in xvi.-xviii., with straight or curved short duct. Spermathecae (? usually in vii.-ix.) with long coiled diverticulum.

Hab. Japan.

Some confusion has arisen concerning this species owing to the fact that the examples studied by Goto & Hatai showed the

spermathecae in vi.-viii., instead of vii.-ix. as described by Horst, Rosa, and Michaelsen. The latter has now solved the difficulty by finding that in some specimens, which he distinguishes as a variety *lenzi*, the spermathecae have that position. Moreover these worms are smaller than the type, 90-145 mm., and have rather fewer setae. The gizzard-septa are entirely absent, and the sperm-sacs have a small "Anhangsblase" such as occurs in many worms, but (as is also sometimes the case elsewhere) sunk into the proper sperm-sac. The example studied by myself belongs to this variety, and has the spermathecal pores between v./vi.-vii./viii. It is smallish, and has a bent instead of a straight duct to the spermiducal glands. I observed the same accessory lobe to the sperm-sacs that Michaelsen refers to.

64. *Amyntas ijimæ* Rosa.

Perichæta ijimæ, Rosa, Ann. k.-k. Hofm. Wien, vi. p. 402.

Perichæta kamakurensis, Goto & Hatai, Ann. Zool. Japon. ii. p. 68.

Perichæta parvula, iid. ibid. p. 68.

Perichæta decimpapillata, iid. ibid. p. 71.

110-150 mm., 115 segments. 60 setae on viii. Papillae paired on vi.-viii. and on xvii.-xix., as many as two pairs to each segment. Spermiducal gland extensive, in xv.-xx.; sometimes absent. Spermathecae with minute diverticula or without any.

Hab. Japan.

I unite the three species described as separate by Messrs. Goto & Hatai with Dr. Rosa's *Perichæta ijimæ* on account of the missing or small spermathecal diverticula. Rosa's species only differs in the greater number of setae in the spermathecal region (60 as against 36) and in the absence of papillae. But these latter are so inconstant that the fact is not necessarily fatal to the collocation of these forms. *P. parvula* is very minute, only 32 mm., with 48 segments, and has no genital papilla or spermiducal gland. To this form it may be necessary to assign a separate specific name. But I do not do this for the present. It has no diverticula, while *decimpapillata* has "very small diverticula."

65. *Amyntas acrophilus* Rosa.

Perichæta acrophila, Rosa, Ann. Mus. Civ. Genova, (2) xvi. p. 527.

73 mm., 110 segments. Setae closer ventrally, 30 on vii., 40 on xxv. 14 setae between male pores. Septum viii./ix. feeble. Spermiducal glands occupying five segments, with short duct. Diverticulum of spermatheca zigzag, longer than pouch.

Hab. Sumatra.

66. *Amyntas brevis* Rosa.

Perichæta brevis, Rosa, Ann. Nat. Hist. (7) ii. p. 283.

20 mm., 80 segments. Setae 50 on xxv. 14 setae between male

pores. Gizzard-septa both present. Sperm-sacs x.-xii. Spermiducal gland occupying 6 segments. Spermathecæ almost globular, with duct not so long as pouch.

Hab. Christmas Island.

67. *Amyntas agrestis* Goto & Hatai.

Perichæta agrestis, Goto & Hatai, Ann. Zool. Japon. iii. p. 17.

160 mm., 96 segments. Setæ 36-40. Papillæ to inside of spermathecæ on vii., viii. Cæca seven pairs. Spermiducal glands entirely absent. Diverticulum of spermathecæ long.

Hab. Japan.

In some specimens there are a pair of papillæ upon xviii.

68. *Amyntas birmanicus* Rosa.

Perichæta birmanica, Rosa, Ann. Mus. Civ. Genova, (2) vi. p. 164.

130 mm., 112 segments. Setæ 70 on each segment, 15 between male pores. Spermiducal glands in three segments, with bent duct. Spermathecal diverticulum coiled.

Hab. Bhamo (Irrawaddi).

H. Spermathecæ 1 pair in viii.

69. *Amyntas zebra* Benham.

Perichæta zebra, Benham, Ann. Nat. Hist. (6) xviii. p. 442.

Amyntas zebra, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 73.

200 mm., 146 segments. Setæ 62 on vi., 78 on xxvi.; 10 setæ between male pores. Papillæ, one pair between male pores. Spermiducal gland in xvi.-xviii., with curved duct. Diverticulum shorter than pouch, coiled.

Hab. Celebes.

I. Spermathecæ 1 pair in ix.

70. *Amyntas pataniensis* Mich.

Perichæta pataniensis, Michaelsen, Abh. Senck. nat. Ges. xxiii. p. 222.

40-110 mm., 78-120 segments. Setæ 40 on v., 54 on xxvi. Male pores and spermathecal pores close together. Papillæ present anteriorly as well as posteriorly. Sperm-sacs in xi.

Hab. Batjan, Patam, Halmahera.

Michaelsen divides this species into two subspecies, of which the first has the species name, the second he terms *labuensis*. The former has really two pairs of spermathecæ, but the anterior pair are small and in process of disappearance. The resemblance of this species to *A. halmaheræ* is considerable, especially in the approximation of generative pores and in the papillæ.

71. *Amyntas supuensis* Mich.

Perichæta supuensis, Michaelsen, Abh. Senck. nat. Ges. xxiii. p. 225.

115 mm., 145 segments. Setæ very numerous and small, 132 on vi., 154 on vii., 106 on xxvi. Papillæ on xviii., xix., several pairs, and on viii., ix., one pair each. Spermiducal gland not large, embracing a thick short duct.

Hab. Halmahera, Supu.

Here again, as in *A. halmahera*, the generative orifices are closely approximated to each other.

K. Spermathecæ 2 pairs in vi., vii.

72. *Amyntas biserialis* Perrier.

Perichæta biserialis, Perrier, Comptes Rend. lxxxi. p. 1044; Beddard, P. Z. S. 1890, p. 63.

Perichæta biserialis, Michaelsen, Abh. Senck. nat. Ges. xxiii. p. 226; Horst, Notes Leyd. Mus. xx. p. 201; Beddard & Fedarb, P. Z. S. 1899, p. 803.

Perichæta acystis, Beddard, Monograph Oligochæta, p. 423.

Megascolex biserialis, Vaillant, Annelés, 1889, p. 76.

135 mm., 167–220 segments. Setæ on each side of ventral line much enlarged; those of anterior segments also enlarged; 81 on v., 90 on x., 70 on xxvi. 14 setæ between male pores. Papillæ paired on xix.–xxv. (maximum number). No cæca. Sperm-sacs in xi–xiii. Spermiducal glands in xvi.–xix., with curved duct. Spermathecæ paired, 3–6 in each segment, often asymmetrical, sometimes entirely absent.

Hab. Philippines, Madagascar, Guiana.

There can be no doubt as to the identity of the two species included in the present. The number of setæ on the segments varies considerably. The numbers given above are those of Michaelsen. The prevalent number of papillæ is 3 to 5 pairs. Perrier found 7, a number which has not been found by other observers. Out of the 33 examples of the species which have been studied, 12 had no spermathecæ. Generally there are no setæ upon the clitellum; but in one individual at any rate there were a pair upon segment xvi.

73. *Amyntas hasselti* Horst.

Megascolex hasselti, Horst, Notes Leyd. Mus. v. p. 190.

Perichæta hasseltii, id. Vermes in 'Midden-Sumatra,' p. 5.

70 mm., 100 segments. Setæ 70–75, those of ventral surface crowded together. Spermiducal glands much divided, with short straight duct. Spermathecæ with diverticulum half the length of pouch.

Hab. Lebong.

74. *Amyntas nanus* Rosa.

Perichaeta nana, Rosa, Ann. Mus. Civ. Genova, (2) xvi. p. 519.

30 mm., 95 segments. Setæ with slight dorsal and ventral gaps, 36 on xii., 32 on xxv. 6 setæ between male pores. Dorsal pores from vii./viii. Spermiducal glands in xvii.-xxi., with slightly bent duct. Diverticulum longer than spermatheca.

Hab. Sumatra.

L. Spermathecae numerous in vi., vii.

75. *Amyntas stelleri* Mich.

Perichaeta stelleri, Michaelsen, Jahrb. Hamb. wiss. Anst. viii. p. 337.

Perichaeta barami, Michaelsen, Abh. Senck. nat. Ges. xxiii. p. 203.

Perichaeta stelleri, Horst, Notes Leyd. Mus. xx. p. 205; Michaelsen, Abh. Senck. nat. Ges. xxiii. p. 202.

Perichaeta everetti, *P. papillata*, *P. sarawacensis*, *P. kinabaluensis*, Beddard, Mon. Olig. p. 428.

Perichaeta everetti, *P. papillata*, *P. sarawacensis*, *P. kinabaluensis*, Beddard & Fedarb, Ann. Nat. Hist. (6) xvi. p. 69 etc.

Amyntas stelleri, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 36.

115-300 mm., 160 segments. Setæ with slight dorsal gaps, those of anterior segments stronger, 42 on v., 55 on xxiv. Paired papillæ to some or all of xix.-xxx. No cæca. Sperm-sacs in x.-xiii. Spermathecae 2-20 pairs.

Hab. Celebes, Sangir, Borneo.

The question of the identity or the non-identity of the various species here grouped together in deference with the arrangement of Drs. Horst and Michaelsen does not appear to me to be quite settled.

Horst found that in numerous examples studied by him, the number of papillæ ranged in number from a single pair through two, three, four, five, eight, nine, and ten pairs, there being occasionally an asymmetry. This seems to dispose of at any rate one alleged specific difference between the four species described by myself and *stelleri* of Michaelsen. A renewed study of my own material and the dissection of many more individuals than those which formed the basis of my original description, has led to the following results.

In 32 individuals from Merabah there were never more than two pairs of papillæ upon segments xix., xx. Occasionally an asymmetry showed itself, there being only one of one pair present, and occasionally papillæ were totally absent. In all of these same specimens the spermathecae were small in number, not more than two in segment vi. and not more than four pairs in segment vii.

The sperm-sacs of this series are four pairs in x.-xiii. The last

heart is in segment xii. This assemblage of characters does not correspond exactly with any of the forms described by myself; nor does it fit in with any of the varieties described by Michaelsen.

In two individuals examined by myself and belonging to another series, I find the following characters:—The papillæ three pairs on xix.–xxi.; the last heart is in xii.; the sperm-sacs in x.–xiii.; the spermathecæ are more numerous, in one specimen 7 and 6 in vi., 8 and 9 in vii.; in the other 11 and 12 in vi. and 14 in vii. A third individual came nearer to the first described variety in that it had not more than three spermathecæ on each side of each of the segments vi., vii. (the actual numbers were 1-2, 3-3). There are no papillæ; the last heart is in xii., the sperm-sacs in xi.–xiii.

This form seems to come nearest to Michaelsen's variety *klabattensis*, in which the last heart is also in xii., the spermathecæ 8-11 pairs, but which has no papillæ.

Another individual agreeing with the last in having three papillæ (those of one side of body were missing) has also sperm-sacs in x.–xiii., 5 to 10 spermathecæ on each side of the body in their respective segment, but has the last heart in xiii.

Three specimens had five pairs of papillæ, sperm-sacs in x.–xii. or xiii., last heart in xiii., spermathecæ varying from four to twelve on each side of their respective segment. In one of these there were setæ on the last segment of the clitellum, a feature which is not present in other specimens that have been examined. This group seems to agree with the variety *seriata* of Michaelsen, but differs in some small points. I confess that there seems to me to be no way out of merging all these specimens with those I have described previously and with those of Michaelsen and Horst into one species, *Amyntas stelleri*. But the variation in such features as the position of the last heart, which is usually so well marked a character, is very curious.

This species it is quite clear comes near to the next. It is, however, as far as our present information goes, to be distinguished by the absence of specially enlarged ventral setæ. In other respects, however, it is very near, and it may be necessary ultimately to merge to two.

M. Spermathecæ numerous in vi.

76. *Amyntas phacellotheca* Mich.

A. phacellotheca, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 47.

130 mm., 115 segments. Setæ with dorsal gaps, those of anterior segments larger, 25 on v., 75 on xxvi. Male pores closely approximated. No cæca. Last heart in xii. Sperm-sacs in xi.–xiii. Spermiducal gland with S-shaped duct. Spermathecæ, three pairs asymmetrical.

Hab. Celebes.

Only a single example known.

4. *Setæ* present on clitellum; gizzard-septa sometimes represented; no terminal bulbus.

A. Spermathecæ 5 pairs in v.-ix.

77. *Amyntas loriæ* Rosa.

Perichaeta loriæ, Rosa, Ann. Mus. Civ. Genova, (2) xix. p. 61.

Perichaeta loriæ, Beddard, Willey's Zool. Results, pt. ii. p. 185.

130 mm., 99 segments. *Setæ*, 60 on v., 70 on xxv. *Setæ* present on all segments of clitellum or on xv., xvi., or on xvi. Male pores with 10 *setæ* between. Papillæ on xvii., xix., xx., on line with male pores. Septum viii./ix. present. No cæca. Sperm-sacs in xii. Spermiducal gland in xviii. only. Diverticulum as long as duct of spermatheca.

Hab. British New Guinea; Solomon Is.

The female pore is at least sometimes paired.

78. *Amyntas solomonis* Beddard.

Perichaeta solomonis, Beddard, Willey's Zool. Results, pt. ii. p. 188.

140 mm., 90 segments; a stout worm. *Setæ* present at least on xvi. of clitellal segments. 15 *setæ* between male pores. Rows of 3-6 papillæ on x., xi., xx.-xxiii. Septum viii./ix. present. Last hearts in xii. Sperm-sacs x.-xii. Spermiducal glands xviii.-xx., with curved duct. Diverticulum of spermatheca half the length of pouch.

Hab. Solomon Is.

79. *Amyntas subulatus* Mich.

A. subulatus, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 29.

70 mm., 116 segments. *Setæ* closer ventrally, with slight dorsal gap. Dorsal pores from vi./vii. *Setæ* on all segments of clitellum. 26 *setæ* between male pores. Papillæ paired on x., xi., xvii., xix., xx. No cæca; gizzard-septa present. Spermiducal glands in xviii., xix., with straight duct. Spermathecal diverticulum half the length of pouch.

Hab. Celebes.

80. *Amyntas violaceus* Beddard.

Perichaeta violacea, Beddard, Monograph Oligochæta, p. 407.

80 mm., 89 segments; slender worm. *Setæ* 44 on v., 40 on xvi.; on all segments of clitellum. Papillæ one pair on xviii.-xix., large. Last heart in xii. Spermiducal glands xvi.-xx., with long and bent duct. Spermathecal diverticula nearly as long as pouch.

Hab. Penang; West Indies.

B. Spermathecæ 4 pairs in vi.-ix.

81. *Amyntas posthumus* Vaillant.

Perichaeta posthuma, Vaillant, Ann. Sci. Nat. (5) x. p. 228, and Mém. Ac. Montpellier, vii. p. 146.

Perichaeta affinis, Perrier, Nouv. Arch. Mus. Paris, viii. p. 106.

Perichæta posthuma, Horst, Notes Leyd. Mus. v. p. 106; xv. p. 318.

Megascolex affinis, Beddard, Ann. Nat. Hist. (5) xii. p. 214.

Perichæta posthuma, Beddard, *ibid.* (5) xvii. p. 93.

Perichæta affinis, Beddard, P. Z. S. 1887, p. 389.

Perichæta posthuma, Horst, Zool. Ergebn. Max Weber, ii. p. 61.

Amyntas posthumus, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 74.

Perichæta posthuma, Michaelsen, Abh. Senck. nat. Ges. xxiii. p. 201.

Perichæta posthuma, Rosa, Ann. Nat. Hist. (7) ii. p. 289.

Megascolex posthumus, Vaillant, Annelés, 1889, p. 72.

95 mm., 70 segments; stoutish worm. Setæ 140 on viii., 90 on xvii. Setæ on all segments of clitellum. Papillæ on xvii., xix. corresponding in position with male pores. Septum viii./ix. present. Spermiducal gland in three segments, with curved duct. Spermathecae with diverticulum less than pouch.

Hab. Java, Celebes, Christmas Is., Philippines, Cochin China, Bahamas, Europe.

The cæca appear to be sometimes absent.

82. *Amyntas neoguinensis* Mich.

Perichæta neoguinensis, Michaelsen, Arch. f. Naturg. 1892, p. 229.

Perichæta neoguinensis, Rosa, Ann. Mus. Civ. Genova, (2) xix. p. 60.

140–220 mm., 94–130 segments. Setæ 85 on v., 100 on xxv. Setæ on all clitellar segments, 14, 16, 20 in number. 20 setæ between male pores. Papillæ paired on xix.–xxv., or xxvi., corresponding in position to male pores. Septum viii./ix. rudimentary. Sperm-sacs in xii. only, with dorsal narrow constricted sac. Spermiducal glands confined to segment xviii., with short straight duct. Spermathecal pores approximated, with very short sessile diverticulum.

Hab. New Guinea.

To a slight variation Rosa gives the name of var. *spectabilis*.

83. *Amyntas pacificus* Beddard.

Perichæta pacifica, Beddard, Willey's Zool. Results, pt. ii. p. 190.

38–56 mm., 90 segments. Setæ 37 on viii., 46 on xvii. 10 setæ between male pores. Papillæ large and median, upon xvii.–xxii., and xii., xiii. Setæ upon xvi. and often other clitellar segments. Both septa. Last hearts in xii. Sperm-sacs in xii.; testes &c., only one pair. Spermiducal gland xvii.–xix., with short straight duct.

Hab. New Britain.

84. *Amyntas celebensis* Mich.

A. celebensis, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 32.

60 mm., 90 segments. Setæ 49 on vi., 44 on xxvi., with slight

dorsal gaps. Dorsal pores from vi./vii. Clitellum begins in xiii.; it has setæ on all segments. Papillæ paired on xvii./xviii., xviii./xix., corresponding with male pores, and three pairs on xix.-xxi. within line of male pores. Also anterior papillæ upon viii. No cæca. Both septa present. Spermiducal glands in three segments, with short straight duct. Diverticulum of spermatheca $\frac{2}{3}$ length of pouch.

Hab. Celebes.

Only a single specimen is known.

85. *Amyntas feæ* Rosa.

Perichaeta feæ, Rosa, Ann. Mus. Civ. Genova, (2) vi. p. 161.

360 mm., 160 segments. Clitellum reaching to xvii. Setæ 100 on vii. Spermiducal gland with very long duct. Diverticulum of spermatheca zigzag.

Hab. Tenasserim.

86. *Amyntas glandulosus* Rosa.

Perichaeta glandulosus, Rosa, Ann. Mus. Civ. Genova, (2) xvi. p. 607.

Perichaeta hippocrepsis, id. ibid. p. 524.

110 mm., 130 segments. Setæ 80 on viii., 70 on xxv. Setæ on xvi. or all of clitellar segments. Male pores surrounded by many small papillæ. Similar papillæ in front of and behind each spermathecal pore. Spermiducal gland in xvii.-xx., with curved duct. Spermathecal diverticulum zigzag, $\frac{2}{3}$ length of pouch.

Hab. Sumatra, Mentawai.

I think there can be no doubt about the identity of these forms. The number of setæ is stated to be different in the two; but this does not appear to be always a reliable character. The absence of papillæ anteriorly in the form *hippocrepsis* is again not necessarily a matter calling for specific rank.

87. *Amyntas queenslandicus* Fletcher.

Perichaeta queenslandica, Fletcher, Proc. Linn. Soc. N. S. W. (2) i. p. 962.

120 mm., 120 segments. Setæ on all clitellar segments. Setæ 60. 14 setæ between male pores. Papillæ paired on ix.-xi. and xvii.-xxii. Sperm-sacs with dorsal appendices. Spermiducal glands large, in xviii.-xxi., with short duct. Diverticulum of spermatheca very short.

Hab. Queensland.

Mr. Fletcher is evidently not accurate in the enumeration of the segments in some of the organs. He states that the spermatheca are in v.-viii., which does not seem likely, especially as he states that the cæca are given off in xxv. Therefore I have some hesitation in copying his statement that the last pair of hearts is in xii., as this is, when certainly stated, rather an important specific character.

88. *Amyntas mazarredi* Rosa.

Megascolex mazarredi, Rosa, Atti R. Acc. Torino, xxix. p. 6.

200 mm., 105 segments. Setæ interrupted dorsally and ventrally, 100 on xxv. Clitellum xiii.–xiv., with setæ on all segments. A depression, square in outline, occupies segments xvii.–xx. Papillæ paired on xvii. and xix. Gizzard-septa present. No cæca. Spermiducal glands limited to xviii. Spermatheca with very short sessile diverticulum.

Hab. Marinduque in Philippines.

Dr. Michaelsen has called attention to the fact that this species, referred by Rosa to the genus *Megascolex* on account of certain obvious characters mentioned above, should be placed in *Amyntas* on account of the position of the gizzard in viii.

89. *Amyntas papua* Rosa.

Perichaeta papua, Rosa, Ann. Mus. Civ. Genova, (2) xix. p. 63.

84 mm., 84 segments. Setæ 44 on v., 66 on xxv. Setæ on all clitellar segments. Male pores very close, with 4 setæ between. Two or three papillæ on viii., ix. Sperm-sacs one pair in xii.; they extend through three segments and have a small median narrow prolongation. Spermiducal glands in xvii.–xix. Diverticulum of spermatheca shortish.

Hab. British New Guinea.

90. *Amyntas peregrinus* Fletcher.

Perichaeta molokaiensis, Beddard, P. Z. S. 1896, p. 201.

Perichaeta floweri, Benham, Journ. Linn. Soc., Zool. xxvi. p. 217.

Perichaeta peregrina, Fletcher, Proc. Linn. Soc. N. S. W. (2) i. p. 969.

Perichaeta peregrina, Rosa, Ann. Mus. Civ. Genova, (2) xvi. p. 515.

Amyntas peregrinus, Beddard in 'Fauna Hawaiïensis,' 1900, p. 414.

120 mm., 116 segments. 10 setæ between male pores. Setæ 40 on xiii., 45 on xxvi. Setæ on xvi. Spermiducal gland with short curved duct. Diverticulum straight, as long as spermatheca.

Hab. Singapore, Sumatra, Hawaii, S. Australia.

I agree with Michaelsen as to the identity of my "*molokaiensis*" with "*peregrinus*," and I think there can be no question as to "*floweri*" being a synonym.

C. Spermatheca 3 pairs in vi.–viii.

91. *Amyntas papulosus* Rosa.

Perichaeta papulosa, Rosa, Ann. Mus. Civ. Genova, (2) xvi. p. 525.

50 mm., 115 segments. Setæ 54 on v., 60 on xxv. Setæ on all or some of clitellar segments. About 100 papillæ on xvii.,

xviii., between male pores. Spermiducal gland xvi.-xxi., with short horseshoe-shaped duct. Spermathecæ long pouches, with coiled duct about half their length.

Hab. Sumatra.

92. *Amyntas hawayanus* Rosa.

Perichæta hawayana, Rosa, Ann. k.-k. Hofmus. Wien, vi. p. 396.

Perichæta hawayana, Michaelsen, Zool. Jahrb., Syst. Abth. xii. p. 224.

Amyntas hawayanus, Beddard, in 'Fauna Hawaiiensis,' 1900, p. 420.

Perichæta pallida, Michaelsen, Arch. f. Naturg. 1892, p. 227.

Perichæta mandhorensis, id. ibid. p. 241, & Jahrb. Hamb. wiss. Anst. xvi. p. 86.

Perichæta bermudensis, Beddard, P. Z. S. 1892, p. 160.

Perichæta morrisi, id. ibid. p. 166.

Perichæta morrisi, Rosa, Ann. Mus. Civ. Genova, (2) xvi. p. 516.

Perichæta barbadensis, Beddard, P. Z. S. 1892, p. 167.

Perichæta mauritiana, id. ibid. p. 170.

Perichæta mauritiana, Michaelsen, Abh. Senck. nat. Ges. xxi. p. 235.

Perichæta amazonica, Rosa, Atti R. Accad. Torino, p. 14.

Perichæta sancti jacobii, Beddard, P. Z. S. 1895, p. 239, and Hamb. Magall. Reise, p. 61.

Perichæta carnosa, Goto & Hatai, Ann. Zool. Jap. iii. p. 16.

Perichæta insulæ, Beddard, P. Z. S. 1896, p. 204.

Perichæta cupulifera, Fedarb, P. Z. S. 1898, p. 445.

60-140 mm. Setæ larger on anterior segments, up to 60 or 'so in number per segment. Papillæ in neighbourhood of male pores, and also paired on some of segments which contain spermathecæ. Sperm-sacs often with median process. Spermiducal gland in several segments, with not long, curved or straight duct. Spermathecæ (occasionally two pairs only) with diverticulum of about same length.

Hab. Borneo, China, Mauritius, Hawaii, Bermudas, Barbados, South America, Teneriffe.

In my account of the earthworms of Hawaii, published in the 'Fauna Hawaiiensis,' I have stated in full my reasons for uniting the five reputed species enumerated in the above synonymy. I condense from that a sufficient abstract for my present purpose. *A. hawayanus* does not, as I have suggested, differ from *A. bermudensis* in the absence of setæ upon the clitellum; but this occasionally occurs in *hawayanus*. Both of these forms may have anterior papillæ on the viith segment near to the spermathecal pores. They are by no means always present in either. The two forms have sometimes simple cæca without the series of rounded processes inferiorly, which have been mentioned as a characteristic.

The form *hawayanus* must be also united with *barbadensis*; the

latter, however, may have setæ (in addition to those upon xiv.) on xvi. & xv. The papillæ may be anterior as well as posterior as in *hawayanus*; the setæ of some of the anterior segments are enlarged as in that form. The spermathecæ are occasionally reduced to two pairs, in vi., vii.; but as the usual three are to be found, no specific difference can be made upon this point. *P. morrissi* differs only in the fact that the spermathecæ are in vi., vii., or in vii., viii. There are anterior and posterior papillæ. In *P. mauritiana* there are three pairs of spermathecæ in vi.-viii.; in one individual I found a fourth pouch on one side of the body in ix. The setæ on segments iii.-vii. are larger than those on other segments. Thus there are clearly no marked differences to say the least from the other forms which I here unite into a single species. *P. pallida* of Michaelsen cannot be plainly distinguished from the present series. Michaelsen mentions the absence of the larger setæ upon the anterior segments, and the closer approximation of the male pores as reasons for not confusing it with *hawayanus*. As to the former matter, it would be necessary for me to separate one of the individuals which I have referred to *barbadensis*, if this were to be considered a sufficient reason. As to the latter point, I do not understand from Michaelsen's description that the male pores are really close; he speaks of them as "ziemlich weit von einander." I think that there is every reason to accept Michaelsen's identification of *amazonica* with his *pallida*. And my own form *sancti jacobii* can hardly be separated. Of both of these latter only a single example has been examined. Of *mandhorensis* again only a single example is known. But Dr. Michaelsen's description of this specimen leaves no great doubt of its likeness to the worms of the present series. It has larger setæ on segments ii.-ix., as in *hawayanus*; the cæca have the crenated appearance of those of the latter form; the spermathecæ occupy the same segments and are of similar form. No anterior papillæ appear to exist; but as only a single example was described, this cannot be considered a reason for specific separation.

D. Spermathecæ 3 pairs in segments vii.-ix.

93. *Amyntas hupeiensis* Mich.

Perichata hupeiensis, Michaelsen, Abh. Ver. Hamb. xiii. No. 2, p. 35.

Amyntas hupeiensis, id. Jahrb. Hamb. wiss. Anst. xvi. p. 6.

55 mm., 132 segments. Setæ closer ventrally, and larger ventrally on anterior segment, 95 on x., 72 on xxvi. Setæ ventrally on all segments of clitellum. Male pores rather close together. Papillæ before and behind each male pore and two pairs on xvii./xviii., xviii./xix. Septa viii./ix., ix./x., very thick. Spermiducal glands in xvii.-xx., with thin winding duct. Spermathecal diverticulum longer than pouch.

Hab. China, Japan.

E. Spermathecæ 3 pairs in vi.–viii.

94. *Amyntas sedgwicki* Benham.

Perichaeta sedgwickii, Benham, Journ. Linn. Soc., Zool. xxvi. p. 201.

Perichaeta sedgwickii, Beddard, Willey's Zool. Results, pt. ii. p. 183.

110 mm., 86 segments. Setæ 29 on vi., 50 on xii.; complete circles of setæ on all clitellar segments. Male pores separated by 8 setæ. Papillæ paired on x.–xiii., xvii., xix.–xxi., with pairs on xvi., xix., xx. outside of these. A single unpaired ventral cæcum arising in xxii. Last heart in xii. Spermiducal gland in xvii.–xix., with short straight duct. Diverticulum of spermatheca short, nearly sessile sac.

Hab. New Britain.

95. *Amyntas iris* Mich.

Megascolex iris, Michaelsen, Arch. f. Naturg. 1892, p. 244.

Amyntas iris, id. Jahrb. Hamb. wiss. Anst. xvi. p. 15.

240 mm., 240 segments. Setæ with dorsal and ventral gaps, closer ventrally, 32 on vi., 42 on xxvi. Males pores 1 mm. apart, as are spermathecæ. Clitellum xiii.–xvii. Papillæ paired on xix./xx., xx./xxi., close to median line. Septum viii./ix. present. No cæca. Spermiducal glands with almost straight duct. Spermathecæ with very small diverticulum.

Hab. Philippines.

96. *Amyntas margaritaceus* Mich.

Megascolex margaritaceus, Michaelsen, Arch. f. Naturg. 1892, p. 245.

Amyntas margaritaceus, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 16.

90 mm., 103 segments. Setæ with dorsal and ventral gaps, 24 on vi., 20 on xxvi. Male pores 1.3 mm. apart. Clitellum xiii.–xvii. Groups of pores on segments x./xi., xviii./xix., xix./xx. Spermathecæ with longer diverticulum than last species.

Hab. Philippines.

These two species were first referred to the genus *Megascolex*, to which they have clearly many points of likeness. There are regular or irregular lines upon the dorsal and ventral surfaces which are unoccupied by setæ. In any case these two species cannot be confounded with any others. There are no penial setæ. For this reason and the position of the gizzard, the two forms appear to be rightly placed in the present genus.

F. Spermathecæ 2 pairs in vii., viii.

97. *Amyntas godeffroyi* Mich.

A. godeffroyi, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 17.

105 mm., 95 segments. Setæ on iv.–viii., enlarged especially

ventrally, with slight dorsal gaps; 27 on v., 48 on xxvi. Setæ on xvi. and (fewer) on xiv. Papillæ on xvi., xvii. in line with male pores. Septum viii./ix. thin, next absent. Spermiducal gland-duct almost straight. Diverticulum of spermatheca half the length of pouch.

Hab. Viti.

G. Spermathecæ 2 pairs in viii., ix.

98. *Amyntas forbesi* Beddard.

Perichæta forbesi, Beddard, P. Z. S. 1890, p. 65.

220 mm. Setæ on ventral side of all clitellar segments. Papillæ paired and corresponding in position with male pores on xvii., xix.–xxi. Sperm-sacs in xii. Rudiments of septum viii./ix. Spermiducal glands with short, very thick duct. Spermathecæ with very short duct into which opens very short diverticulum.

Hab. New Guinea.

The anterior spermathecæ were doubled on one side (the side differing) in the two specimens which I have examined.

99. *Amyntas robustus* Perrier.

Perichæta robusta, Perrier, Nouv. Arch. Mus. Paris, viii. p. 112.

Perichæta robusta, Michaelsen, Abh. Senck. nat. Ges. xxi. p. 234.

Perichætu cingulata, Vaillant, Ann. Sci. Nat. (5) x. p. 228 (in part), & Mém. Ac. Montpellier, vii. p. 146 (in part).

Megascoleæ robustus, Vaillant, Annelés, 1889, p. 76.

180 mm.; setæ 45. A pair of papillæ between male pores and a pair on each of segments viii., ix. Sperm-sacs with dorsal process. Spermiducal glands with coiled duct. Diverticulum of spermatheca longer than pouch and moniliform at end.

Hab. Ile de France; Philippines.

H. Spermathecæ 1 pair in viii.

100. *Amyntas taprobanæ*.

Perichæta taprobanæ, Beddard, P. Z. S. 1892, p. 163.

Perichæta pauli, Michaelsen, Jahrb. Hamb. wiss. Anst. xiv. p. 87; id. Zool. Jahrb., Abh. Syst. xii. p. 140.

145 mm., 95–122 segments. Setæ 70 on v., 54 on xxvi. Complete rings on all clitellar segments. Papillæ large, paired on vi.–xi. and xviii.–xxi. Septæ viii./ix. present. No cæca. Spermiducal glands small in xviii. only, with U-shaped duct. Spermathecæ small, with equally sized diverticulum.

Hab. Ceylon.

There is no doubt about the identity of these two species, accepted by Michaelsen. A re-examination of the original specimens has shown the presence of the large faint papillæ. A characteristic of the species is the very small size of the generative apparatus.

I. Spermathecæ 1 pair in vi.

101. *Amyntas lompobatagensis* Mich.

Amyntas lompobatagensis, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 33.

55 mm., 95 segments. Setæ of v.-vii. rather larger, slight dorsal gaps; 33 on vi., 42 on xxvi. Dorsal pores from v./vi. Papillæ on xvii./xviii., xviii./xix. Duct of spermiducal gland long, divided into a proximal thinner and a distal spindle-shaped portion. Diverticulum of spermatheca small.

Hab. Celebes.

102. *Amyntas pusillus* Ude.

Perichaeta pusilla, Ude, Zeitschr. wiss. Zool. lvii. p. 63.

16 mm., 60 segments. Setæ 40-50. 10 setæ between male pores. Papillæ on xvii. and xix., corresponding in position to male pore, also a median papilla on xx. Spermathecal diverticulum small and spherical.

Hab. Buitenzorg.

Only a single example was examined; but it appears to differ from the last.

K. Spermathecæ 1 pair in segment vii.

103. *Amyntas minimus* Horst.

Perichaeta minima, Horst, Zool. Ergebn. Max Weber, ii. p. 66.

25 mm., 80 segments. Setæ 44 behind clitellum, 60 on vii. Duct of spermiducal gland curved. Diverticulum of spermatheca long. Papillæ on vii.

Hab. Java.

Species which cannot be classified by the above characters entirely.

AMYNTAS CULMINIS, Michaelsen, Jahrb. Hamb. wiss. Anst. xvi. p. 58.

50 mm., 75 segments. Setæ closer ventrally, 48 on v., 46 on xxvi. Clitellum not developed. Three papillæ in middle of 18th segment. Gizzard-septa? Spermiducal glands lying in four segments, with short duct and no terminal sac. Spermathecæ one pair in viii., with very strong muscular duct as long as pouch and diverticulum, of which the duct is much coiled, longer than spermatheca.—Celebes.

AMYNTAS QUADRAGENARIUS, Perrier; *Perichaeta quadragenaria*, Perrier, Nouv. Arch. Mus. Paris, viii. p. 122.

210 mm. (exaggerated through softening); 40 setæ in segments in front of clitellum. Sperm-sacs in xi., xii. Spermathecæ one

pair in viii., with very long diverticulum which is much folded. Intestinal cæca? Spermiducal gland much lobed. Terminal sacs?

Although Perrier's definition is not adequate so far as our present knowledge is concerned, this species does not seem to be identical with any subsequently described form with one pair of spermathecae in segment viii. or vii., or ix.

AMYNTAS ELONGATUS, Perrier; *Perichæta elongata*, Perrier, *ibid.* p. 124.

Length? (stated to be 355 mm.; but this length is too great for the diameter of 4 mm.). Sperm-sacs in xi., xii. Spermiducal gland loosely lobate, with bent duct and no terminal sac. Spermathecae in vi. without (?) diverticula.—Peru.

Here again it is impossible to state with even probability that the present species is identical with any subsequently described species.

AMYNTAS TAITENSIS, Grube (in part) in 'Reise der Novara,' Anneliden, 1868, p. 36.

This species, from which one individual of the two described by Grube must be removed and placed in a second species already treated of as *Amyntas novaræ*, has been termed "*Perichæta grubei*" by Rosa (Ann. k.-k. Hofm. Wien, vi. p. 395). It is 90 mm. long and has 120 segments. Four papillæ between male pores. Setæ 60 on viii. Spermathecae open on intersegmental furrows vii./viii., viii./ix.

AMYNTAS PARVUS (Ude, Zeitschr. wiss. Zool. lvii. p. 64) is a small worm 25 mm. long, with 85 segments. Setæ 40-44, 12 between male pores. Spermathecae in viii., ix. with very long and coiled diverticulum. Duct of spermiducal gland broad and short.

I place this species in this place because the author of it says nothing about setæ upon the clitellum and papillæ. As he examined three specimens, it is possible that they were absent. In this case the species seems to be at least very near to *A. æruginosus* or *A. hesperidum*. But I have not been able to make up my mind to include a pygmy like the present form with the giant "*Perichæta musica*," and the spermathecal diverticulum seems to be too long for *A. hesperidum*.

AMYNTAS ACINCTUS Goto & Hatai (Annot. Zool. Jap. iii. p. 16), is a doubtful species so named—and not aptly—because of the undeveloped clitellum. Its characters are:—

130 mm., 113 segments. Setæ 50 to 60, 7 between male pores. Spermiducal glands xvii.-xix. Spermathecae in vi.-viii., with diverticulum twice the length of pouch.

Species which belong to the genus Amyntas, but which cannot be defined.

I shall content myself with giving a bare list of these species, as our information concerning them is entirely limited to a few external characters which are not sufficient to place them with

even approximate accuracy, or to the number only of the spermathecæ.

Amyntas diffringens, Baird, Proc. Zool. Soc. 1869, p. 40 & p. 387.

Amyntas javanicus, Kinberg, Öfv. K. Svensk. Ak. Förh. 1866, p. 439.

Amyntas gracilis, id. ibid. p. 112.

Perichæta corticis, id. ibid. p. 439.

Amyntas subquadrangula, Grube, in 'Reise der Novara,' Annalen, 1868, p. 36.

Amyntas rodericensis, Grube, Phil. Trans. clxviii. p. 554; id. Monatsber. Ak. Berlin, 1877, p. 355.

Amyntas juliani, Perrier, Compt. Rendus, lxxx. p. 1045.

Amyntas bicinctus, id. ibid. p. 1044.

Amyntas tricystis, id. Bull. Soc. Zool. France, ii. p. 243.

Amyntas dicystis, id. ibid. p. 243.

A few other species, such as "*Megascolex sanctæ helene*" of Baird, may belong to this genus. A number of forms described by Schmarda¹ as *Perichæta* have been shown by subsequent investigators not to belong to that genus as now defined but to *Megascolex*. Prof. Spencer² and Mr. Fletcher³ described under the name of "*Perichæta*" worms which belong to other genera and were only provisionally placed in *Perichæta*. The same may be said of several species described by Prof. Bourne.⁴

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¹ Neue wirbellose Thiere beobachtet und gesammelt auf einer Reise um die Erde, 1853, Pt. ii.

² Proc. Roy. Soc. Victoria, v. p. 16 *et seq.*

³ Proc. Linn. Soc. N. S. W. vols. i.-iv.

⁴ P. Z. S. 1886, p. 663.

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